INVESTIGATING THE POTENTIAL RELATIONSHIPS BETWEEN PROJECT MANAGER SKILLS AND PROJECT SAFETY PERFORMANCE

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ABSTRACT

Past research on construction project safety has mainly been focused on safety risks, safety culture, and safety system development. This research aims to reveal project manager skills that could influence project safety performance. It is proposed that project managers need to have four essential skills, namely conceptual, human, political, and technical skill. Through a comprehensive review of relevant literatures, this research argues that project manager skills influence project manager's safety leadership, which ultimately influence project safety performance. A theoretical framework has been developed and future research will focus on collecting empirical data to test these relationships.

Keywords: Construction project safety, Project manager, Conceptual skill, Human skill, Political skill, Technical skill, Project management

INTRODUCTION

In the past, construction projects were considered successful when they achieved three fundamental objectives namely completed on time, accomplished within the budget, and meeting the quality requirements. Nowadays, these fundamental objectives have evolved to include two other objectives, namely safety and sustainability (Khalfan, 2006; Lester, 2007).This research focuses on project safety performance because construction industry has been known to kill and injure more of its workers annually than almost any other industry (Lingard and Rowlinson, 2005). Data for Australia in 2006/2007 showed that construction industry fatality rate was three times higher than the average industry rate (ASCC, 2008). This number suggests that safety is very essential in construction projects due to its potential to bring miseries and deaths to fellow human beings. Furthermore, safety has become a factor that is required by law, thus under no circumstances can safety be compromised (Lester, 2007; NSW Government, 2009).

Achieving project safety performance is one of key performance indicators that determines project success. Project safety performance can be defined as incident and injury free (IIF) during the construction process. In another case, it reflects a strong safety culture fostered among the project team and other project stakeholders who uphold shared value and belief that all incidents and injuries are preventable (Zou et al., 2006). One of the responsibilities of the project manager, as the key person who is responsible for the success or failure of every aspect in the construction projects, is to ensure that the required project safety performance is met during construction (Heerkens, 2002).

Adequate knowledge and skills are crucial for project managers to carry out their tasks. It is well known that there are three essential skills for managers, namely conceptual, human, and technical skill (Robbins et al., 2009). In the field of project management, El-Sabaa (2001) and Goodwin (1993) supported the importance of these skills for project managers. In addition, this research argues that political skill is also essential for project managers, although its importance has seemed to be overlooked. Pinto (2000) stated that political processes dominate the field of project management due to its nature, thus political skill is critical for project managers.

Many studies have been conducted to explore about safety in construction projects, such as construction safety risks (Zou et al., 2007), safety culture and safety climate (Cox and Cheyne, 1999; Glendon and Litherland, 2001; Seo et al., 2004), and safety management (Abudayyeh et al.,

2006). However, there is lack of research that explores the influence of project manager skills towards project safety performance, thus this research intends to fill in this gap. By conducting a comprehensive literature review, this research aims to identify project manager's tasks in relation to project safety performance and reveal project manager skills that could allow the project manager to fulfil these tasks, thus influence project safety performance. A theoretical framework was developed to demonstrate the complexity of project manager's tasks and the skills required to perform those tasks. The research proposes that project manager skills influence project manager's safety leadership, which ultimately will influence project safety performance. The next stage of the research is to collect empirical data to test these relationships.

PROJECT SAFETY PERFORMANCE

Safety is always a critical factor in construction projects because lack of safety can result in accidents, which may lead to human suffering and deaths. This is a condition that cannot be justified by any means. Holt (2005) stated that accidents can incur additional costs and cause project delay, which will put unnecessary burdens to project budget and ruin target completion date. One should also consider that lack of safety can lead to prosecution and civil claim that will incur more costs and cause adverse publicity. Furthermore, Holt (2005) explained that there are two factors that can directly cause accidents, namely unsafe acts and unsafe conditions. These two factors can be flourished when there are poor safety management system and social pressure that does not consider safety as an important issue.

Safety culture and safety climate are terms mentioned frequently when people are discussing about safety. Safety culture is a part of organisational culture and it can be defined as the shared values or beliefs that characterise safety in organisations (Seo et al., 2004). On the other hand, safety climate is the way people behave, think, and feel about safety issues. The difference between the two is that safety culture exists at a higher level, related to overall organisational policies and goals. On the contrary, safety climate exists at a more localised level and serves as the tangible outputs of organisation's safety culture. Safety climate indicates how people perceive and describe the importance of safety issues for the organisation and how local arrangements are implemented to reflect this (Cox and Cheyne, 1999; Seo et al., 2004).

Many studies have agreed upon the importance of safety climate to measure safety performance, thus safety climate is used in this research as the indicator of project safety performance (Glendon and Litherland, 2001; Seo et al., 2004). The advantages of measuring safety climate are: it can identify safety problems before they develop into accidents and injuries, it can focus on safety efforts to improve problematic areas which may improve other organisational functions, it serves as a valuable tool to identify trends in the organisation's safety performance, and lastly measuring safety climate does not spend much money and time (Seo et al., 2004).

Project manager is the highest position in the project level, thus it is project manager's responsibility to manage the overall performance of the project, which includes safety. Fewings (2005) supported this by saying that in a construction project, the project manager is responsible for the implementation of company's safety policy and the coordination of project safety plan. Furthermore, project managers are project leaders, thus they should be able to create and change project climate. By giving special attention to safety, project managers can become leaders to improve project safety performance (Office of the Federal Safety Commissioner, 2007). Dingsdag et al. (2006) provided a list of safety management tasks that project managers need to perform to provide safety leadership. There are 27 tasks separated into six categories as shown in Table 1.

Based on the discussion above, Figure 1 presents the deduction of this research on how project managers can influence project safety performance. The senior management of the company provides supports by creating and communicating company's safety culture throughout the organisation. This safety culture is translated into a safety management system for its implementation in the organisation and projects. As a leader, the role of the project manager is to provide safety leadership by performing their safety management tasks. This safety leadership leads to positive project safety climate, which will promote the elimination of unsafe acts and conditions as well as accidents.

Category	Safety management tasks
Proactively identify, assess, and determine appropriate controls for safety risks	Carry out project risk assessments.
	Consider and perform safety reviews for constructability, operability, and maintenance.
	Undertake formal safety review of tenders.
	Develop project safety management plans.
	Develop project safety procedures and instructions.
	Carry out workplace and task hazard identification, assessments, and control (Safe Work Method Statement).
Effectively communicate and consult with stakeholders regarding safety risks	Provide general safety information and provide basic safety instruction.
	Facilitate group safety discussions and meetings.
	Contribute in planning and delivering toolbox talks.
	Participate in site safety committee.
	Consult on and resolve safety issues.
	Speak to senior management about safety issues in the workplace.
	Challenge unsafe behaviours/attitude at any level when encountered.
	Make site visits and speak directly to workers about safety in the workplace.
	Recognise and reward people who have positively impacted on safety.
Monitor, report, review, and evaluate safety program effectiveness	Carry out formal incident investigations.
	Carry out basic project safety system element audits.
	Carry out formal inspections of workplace and work tasks.
Engage with subcontractors in safety performance management	Monitor subcontractor safety activities and performance.
	Identify and include suitable safety requirements into subcontractor packages.
	Evaluate safety performance of subcontractors.
Identify and implement relevant components of the safety and workers' compensation management system	Understand and apply general legislative safety requirements.
	Apply full working knowledge of the organisation's safety management system.
Provide leadership and manage staff and subcontractor safety performance	Help to mentor staffs and follow their progress in relation to safety.
	Conduct employee safety performance appraisals.
	Work with staffs to solve safety problems.
	Discipline staffs for poor safety behaviours and attitude.

Table 1: Project manager's safety management tasks (Source: adapted from Dingsdag et al., 2006).

PROJECT MANAGER SKILLS – CHPT CONSTRUCT

Project managers are facing varied and complex tasks on daily basis. They are the key persons who are responsible for the success or failure of every aspect in the construction projects (Heerkens, 2002). Furthermore, construction projects require a collaboration of individuals from different backgrounds and teamwork to achieve project objectives. Consequently, project managers also need to manage and lead these people (Lewis, 2003). Adequate skills are vital for project managers to manage these multifaceted tasks. Table 1 demonstrates the multiple tasks that project managers must implement to achieve safety performance. This research argues that project managers need four skills, namely conceptual (C), human (H), political (P), and technical (T) skill to perform their job. These skill sets will be discussed in details in the following sections.
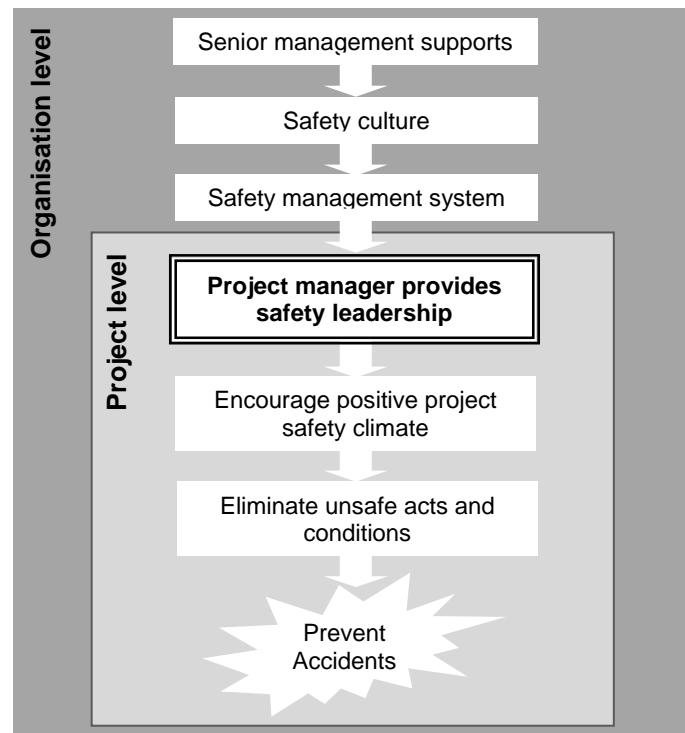
Figure 1: Project Manager's role in project safety performance.

Conceptual skill

Conceptual skill is the ability to envision the project as a whole. The skill recognises that various functions in the project depend on one another where changes in one part could affect other parts (El-Sabaa, 2001). Project managers need conceptual skill to think about abstract situations, to see the project in a big picture, to understand the relationships between different departments, and to imagine how the project fits into its broader environment (Robbins et al., 2009).

This research has found three competencies that form conceptual skill construct. The first competency is *integration*, which includes all processes required to ensure that all project components are properly coordinated. The second competency is *scoping*, which limits and controls the works included in the project. Scoping is critical to ensure that all the works of the project is included (Project Management Institute, 2008). The last competency is *visioning*, which is simply the competency to observe the project as a whole and visualise the relationship of the project with the company, the construction industry and the community. This competency is particularly important to address abstract and external issues as well as constraints that could jeopardise the completion of the project (Goodwin, 1993).

In relation to safety, the research argues that conceptual skill is essential for project managers to realise the impacts and necessities of good safety practices on the workers and their family, the company, the community, and the achievement of project objectives. It helps project managers to understand that safety is really an important and integral part of their project. Furthermore, conceptual skill allows the project managers to address safety issues from a life-cycle perspective rather than limiting it only during the construction stage. For example, they could influence the designer to consider the implication of the design on safety during the construction and management of the building facility.

Human skill

Human skill is the ability to work with and through other people (Goodwin, 1993). There are many stakeholders involved in a construction project, such as the client, consultants, subcontractors, upper management, team members, and community. A stakeholder is a person or organisation that has an interest in the project or the outcome of the project. In this case, a stakeholder may affect or be affected by project processes or outcomes. Each stakeholder has different

expectations and project managers need to manage these expectations (Rosenau, Jr. and Githens, 2005). Managing stakeholders' expectations requires sufficient human skill on the part of the project managers. Furthermore, during the construction process, it is people who perform the works, thus an understanding of human skill to manage these people is vital. This research argues that there are three competencies, namely leadership, emotional intelligence, and interpersonal skill that form human skill construct.

The first competency, *leadership*, is the process of influencing a group of people to achieve goals. Leadership is important because leaders in organisations are people who make things happen (Robbins et al., 2009). Leadership is vital for project managers to bring different stakeholders together and influence them to do what must be done to achieve project objectives (Lewis, 2003). Many studies indicated that transformational leadership is an effective leadership style because it produces levels of employees' effort and performance that goes beyond what would occur with the common transactional approach (Robbins et al., 2009).

Emotional intelligence (EI) is the second competency of human skill construct and it is defined as "the capacity for recognising our own feelings and those of others, for motivating ourselves, and for managing emotions well in ourselves and in our relationships" (Goleman, 1998: pp. 375). Many studies have showed the importance of EI in organisations (Sunindijo et al., 2007). Goleman (2001) identified four dimensions of EI: self-awareness, self-management, social-awareness, and relationship management. Self-awareness means to recognise oneself feeling at the moment and use it in decision making. Self-management is the ability to regulate distressing effects, such as anxiety and anger, and to restrain emotional impulsivity. People high in social-awareness can recognise other people's feelings and read nonverbal cues for emotional currents from others. Lastly, relationship management is the ability to attune oneself to or influence the emotions of others.

The last competency is *interpersonal skill*. Some people in organisations suffer from relationship issues when they relate with their peers, subordinates, and even superiors because they have lack of interpersonal skill. Strohmeier (1992) identified four common interpersonal problems that need to be managed by project managers. The first problem is motivation because typically project managers have lack of formal authority and influence, which can cause difficulties to motivate others. The second problem is conflicts, which are normal occurrences in every organisation. There are many stakeholders in a construction project, thus the potential of conflicts is much higher. Communication is the third interpersonal problem. Due to the involvement of many stakeholders, communication problems, such as insufficient flow of information, the unavailability of information, and misunderstanding, are frequent in construction projects. The fourth and the last problem is teamwork and cooperation. Many project stakeholders are suffered from egotism, which frustrates cooperation and communication. Within a project team, frequently there is lack of willingness to cooperate as well as an inability to cooperate.

This research argues that human skill is required to influence project safety performance because people are the ones who perform the works, thus project managers need human skill to communicate the importance of safety, lead the implementation of safety management system, and motivate and inspire people to work safely. Furthermore, project managers need human skill to manage stakeholders' expectations related with safety.

Political skill
Ahearn et al. (2004: pp. 311) proposed that political skill is "the ability to effectively understand others at work, and to use such knowledge to influence others to act in ways that enhance one's personal and/or organisational objectives". It also includes the ability of performing sensible environmental scanning to understand the complex social, legal, culture, economical, and political systems that affect the achievement of project objectives. Block (1983: pp. 21) defined project politics as "the actions and interactions between project team members and people outside the team that have impact on the success of the project". In this case, project managers are the focal point of this interaction and political skill is particularly crucial for project managers to interact with people outside their direct control, but who have impact on project success. Some people deem

that the conduct of politics is distasteful and organisationally damaging. However, several studies indicated that the effective use of political skill is important for project managers because projects are inherently political arenas where competing interests, limited resources, coalition building, and the exercise of power and influence happen all the time to get things done (Ferris et al., 2000; Pinto, 2000).

The main difference between political skill and human skill is that political skill is specific to interaction aimed to achieve success in organisations (or projects). The interactions can take place anywhere, but the main goal is the organisational influence and success (Ferris et al., 2000). Ferris et al. (2005) proposed four key competencies or dimensions of the political skill. *Social astuteness* is the first competency. It is argued that people with high political skill are astute observers of others and they are keenly attuned to diverse social situations. They are sensitive to others, thus they are considered as ingenious and clever in dealing with others. The second competency is *interpersonal influence*. Another characteristic of people high in political skill is their convincing personal style that exerts a strong influence to people around them. They are flexible and they can appropriately adapt their behaviour to each situation in order to extract certain responses from others.

Another important competency of political skill is the ability to develop and use diverse networks of people or *networking ability*. People included in the networks are considered to hold assets deemed as valuable and necessary for attaining successful personal and organisational functioning. People with high networking ability are often expert negotiators, deal makers, and at ease with conflict management. The fourth and the last political skill competency is *apparent sincerity*. This competency is the key to influence others because it focuses on the perceived intentions of certain behaviour exhibitions. In this case, the influence attempts will be successful when there are no ulterior motives behind the behaviour exhibited. People high in apparent sincerity inspire trust and confidence because they do not appear to be manipulative or coercive.

In some cases, safety is relegated below other project objectives like time and cost. The research argues that by exercising political skill, project managers is able to demonstrate genuine interest towards safety, which will influence others to realise about the importance of safety in the project, thus convince them to put safety as a priority. Furthermore, political skill is a clever way to achieve behaviour coordination and eliminate many barriers that might disrupt safety performance. It inspires trust, confidence, and support. It also orchestrates and facilitates the interaction among team members that can boost safety performance (Ferris et al., 2007).

Technical skill

Technical skill is the job-specific knowledge and techniques that are required to perform specific tasks proficiently (Robbins et al., 2009). Based on various literatures, there are six technical competencies that are essential for project managers (Fisk, 1997; Pritchard, 2001; Project Management Institute, 2008; Westney, 2001). The first competency is *scheduling*, which involves an understanding to determine the dates when different activities will be performed, recognise activities that drive other activities, and determine when the activities are due. *Budgeting and cost management* is the second competency, which involves determining the types and quantities of resources needed to perform various project activities, developing cost estimation for all resources, allocating the budget to individual work activities, and controlling changes to project budget.

Quality management is the third competency of technical skill construct. The activities of quality management include identifying relevant quality standards and determining how to meet them, evaluating project performance periodically to provide confidence that the project will meet the standards, and monitoring specific results to determine their compliance with the standards as well as finding ways to eliminate unsatisfactory performance. The fourth competency is *document and contract administration*, which is about the understanding of procedures for implementing construction contracts according to the accepted practices and regulations within the construction industry. In addition, the system for keeping records and reports of everyday activities should be managed carefully.

Risk management is the fifth competency of technical skill construct. To be competitive, an organisation must be proactive in managing the risks to ensure successful achievement of project objectives. There are four steps in risk management: risk identification where project team and stakeholders identify and categorise risks, risk assessment to assess the impact of each risk category to the project, risk analysis which indicates which cost or schedule elements require the most contingency and which risk categories contributed the most to contingency, and lastly developing risk mitigation steps and assign them to team members. *Procurement management* is the sixth and the last competency. It includes the processes required to attain goods and services from outside the organisation or from external parties. Depending on the application area, these external parties can be consultants, subcontractors, vendors, or suppliers.

In relation to safety, the research argues that project managers need to exercise their technical skill to ensure all site activities are implemented in proper and safe manner. For example, project managers needs to use their risk management competency to identify, assess, and manage safety risks. Furthermore, technical skill can assist project managers to develop new and safer methods to work. Understanding of cost management and scheduling also make project managers realise the severe impacts of accidents towards their project.

PROPOSED THEORETICAL FRAMEWORK

Based on the discussion in the previous sections, this research has developed a theoretical framework as shown in Figure 2 to show the whole picture of the relationships between project manager skills and their tasks. There are five common project stages before the project is completed and handed over to the client. They are initiation, design, procurement, construction, and commissioning. The final outcome of these stages is a project that meets required standards and specifications of time, cost, quality, safety, and sustainability, which have been increasingly considered as fundamental objectives of construction projects.

The framework also presents different project stakeholders that can influence the outcomes of the project, thus the expectations of these stakeholders need to be managed. In the organisation level, there are top management, bosses, team members, and people from other departments. In addition, the project manager needs to pay attention on the company culture as well as the system and technology used in the organisation. In the construction task environment, the project manager has to consider external project team members like consultants, designers, subcontractors, and the client. Other project stakeholders in the construction task environment are government with their laws and regulations, the community that lives around the project, and public. Lastly, the project manager should also be concerned about external environment, such as economic, political, sociocultural, technology, global condition, and the demographic where the project is built (Robbins et al., 2009). All of these stakeholders and external factors can influence the outcomes of the project, which include project safety performance. Without proper consideration and management, they can easily jeopardise the project. It is part of project manager's responsibilities to manage these issues.

The framework also shows project manager skills required to perform these tasks. This research proposes conceptual, human, political, and technical skill (CHPT construct) as the essential project manager skills. Competencies that form each skill construct have also been discussed in the previous sections and included in the framework.

When focusing on project safety performance, it has been mentioned that project managers should provide safety leadership in their project. Project managers need to perform 27 safety management tasks listed in Table 1 to provide this safety leadership. By performing these tasks, it is expected that project managers can create positive project safety climate, which serves as they key indicator of project safety performance. Furthermore, this research argues that project manager skills are essential to perform these safety management tasks successfully. Figure 3 shows the relationships between these three aspects. Project manager skills serve as the input and they influence the performance of project manager's safety leadership, which is expressed in the form of safety management tasks. Ultimately, safety management tasks that have been performed successfully will lead to the achievement of project safety performance, which is

measure by project safety climate. This is the key contribution of this research and the next stage aims to collect empirical data, investigate the validity of the framework and determine, if any, the relationships between the three aspects.
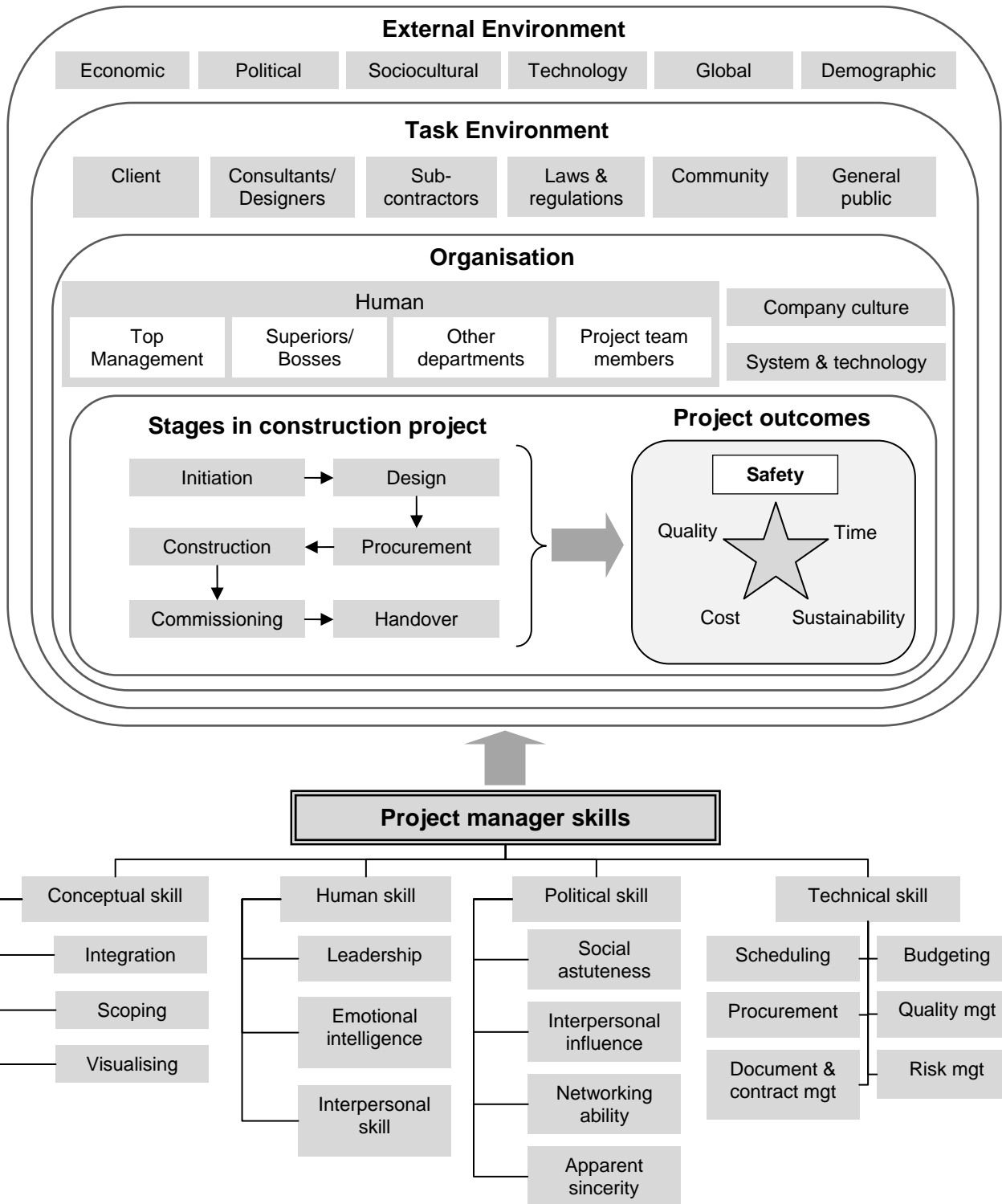
External Environment

| Economic | Political | Sociocultural | Technology | Global | Demographic |

Task Environment

| Client | Consultants/ Designers | Sub-contractors | Laws & regulations | Community | General public |

Organisation

Human

| Top Management | Superiors/ Bosses | Other departments | Project team members |

Company culture

System & technology

Stages in construction project

Initiation → Design

Construction ← Procurement

Commissioning → Handover

Project outcomes

Safety

Quality — Time

Cost — Sustainability

Project manager skills

| Conceptual skill | Human skill | Political skill | Technical skill |

Conceptual skill:
- Integration
- Scoping
- Visualising

Human skill:
- Leadership
- Emotional intelligence
- Interpersonal skill

Political skill:
- Social astuteness
- Interpersonal influence
- Networking ability
- Apparent sincerity

Technical skill:
- Scheduling
- Procurement
- Document & contract mgt
- Budgeting
- Quality mgt
- Risk mgt

Figure 2: A theoretical framework demonstrating the complexity of project manager's tasks, project manager skills required to perform the tasks, and project outcomes.
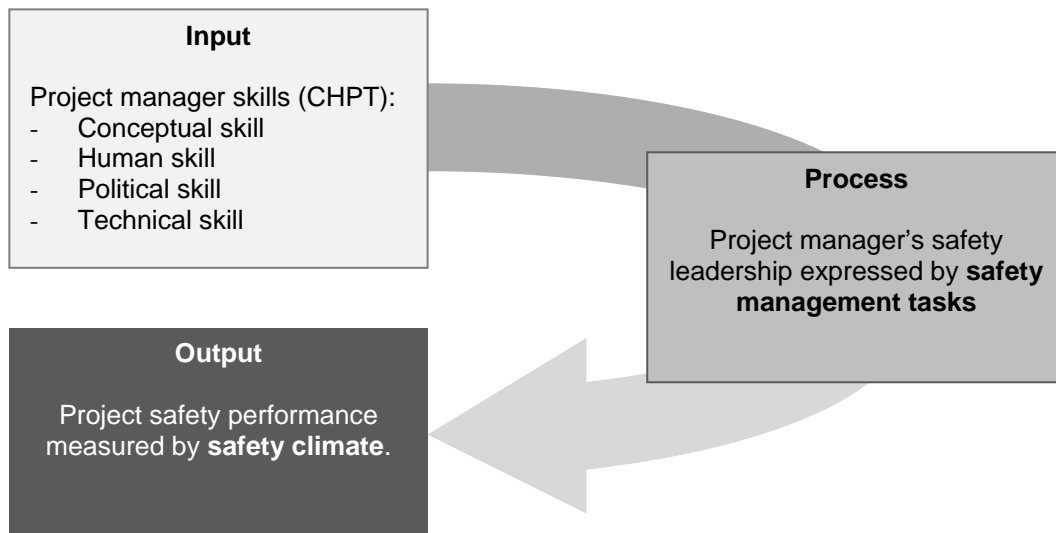
Figure 3: Proposed relationships between project manager skills, safety leadership, and project safety performance.

CONCLUSION AND FUTURE STUDIES

The role of the project manager in project safety performance is to provide safety leadership, which is expressed by performing 27 safety management tasks. In order to manage these tasks, project managers need to acquire four sets of skills, namely conceptual, human, political, and technical skill (CHPT construct). This research has explored each skill in detail and proposed competencies that form each skill construct. It is argued that project manager skills influence project manager's safety leadership, which ultimately will influence project safety performance. The next stage of the research will collect empirical data to investigate the validity of these proposed relationships.

A theoretical framework has also been developed to demonstrate the complexity of project manager's tasks and essential skills to manage those tasks. The framework offers a wide range of possibilities for future studies. For example, each skill and each competency could be explored individually to investigate its impacts towards project safety performance or any other project outcome. Furthermore, there are also potential future studies to find out the most important skill that influences certain project outcome. This way, the construction industry can strategise when providing trainings for project managers to improve their performance.

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