TEAMWORK IN CIVIL ENGINEERING – PAST, PRESENT AND FUTURE

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ABSTRACT

This study is about the past, present and future teamwork in the civil engineering field. Since the topic of this study is very broad, the study will cover on organization structures, teamwork, and Team Development Model (TDM). In the research on the past organization structure of any civil engineering firm, it is found that majority practiced functional organization, whereas now, more and more matrix organization is practiced in the civil engineering organization structure. Nevertheless, in the past, the organization structure had more flaws than the current organization structure, and will keep on improving. The future organization structure is predicted to be either in a projectized form or still in a matrix form. Meanwhile, the teamwork in the past is found to be not as effective as the current teamwork practiced in the civil engineering industry. In the future, it is anticipated that teamwork could be getting better and will be done virtually at any time, any place and on any challenge. The method used for my research is by doing background studies, SWOT analysis, then coming out with results, discussion, recommendation and conclusion. Next, my research on the TDM showed that this general model does not necessarily help in improving the team's performance therefore another TDM is developed to cater for the slight imperfections of the general model. With the help of the new TDM, it should be able to assist the team in attaining the optimum teamwork in the civil engineering world.

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INTRODUCTION

1.1 GENERAL

As mentioned by Ricketts *et al* (2004), civil engineering is that field of engineering concerned with planning, design and construction of natural resource development, regional and local water supply and storm water facilities, waste management facilities, transportation facilities, tunnels, buildings, bridges, and other structures for the needs of people. Persons who are qualified by education and experience and who meet the stated requirements for practicing the profession of civil engineering are called civil engineers.

Hence, for the efficient execution of the various components (design and construction) of a civil engineering project, a superior organization is highly desirable. For example, in design, the various specialists required should form a design team, to contribute their knowledge and skills to the project (Ricketts *et al*, 2004). That is why project management is essentially an organizational innovation, which is the identification of a person or small team responsible for ensuring the effective delivery of the project mission for the client.

According to Gray and Larson (2006), the definition of project management is that, it provides people with a powerful set of tools that improves their ability to plan, implement, and manage activities to accomplish specific organizational objectives.

However, what is a project? A project is a complex, non-routine, one-time effort limited by time, budget, resources, and performance specifications designed to meet customer needs (Gray and Larson, 2006). Civil engineering projects may be considered to have four characteristics:

- Projects come in various shapes, sizes, complexities and purposes.
- Each project is unique.
- Each project works through schedules and budgets to produce a specified result.
- The team of people involved in each project is diverse.

Each project goes through a project life cycle from its beginning to its final completion. The stages in this life cycle according to Gray and Larson (2006) are:

1. ***Defining stage*:** Specifications of the project are defined; project objectives are established; teams are formed; major responsibilities are assigned.

2. ***Planning stage*:** The level of effort increases, and plans are developed to determine what the project will entail, when it will be scheduled, whom it will benefit, what quality level should be maintained, and what the budget will be.
3. ***Executing stage*:** A major portion of the work takes place – both physical and mental. The physical product is produced (a bridge, a report, a software program). Time, cost, and specification measures are used for control.
4. ***Delivering stage*:** Includes the two activities: delivering the project product to the customer and redeploying project resources. Delivery of the project might include customer training and transferring documents. Redeployment usually involves releasing project equipment/materials to other projects and finding new assignments for team members.

All these stages are critical to the completion of a project. However, some projects might not even make it to the completion or even be a success. To succeed in a project, how an individual or a group of people handle management is most important.

Moreover, Babcock (1996) quoted from Baker, Murphy and Fisher (Anon 1), the definition of project success as "If a project meets the technical performance specifications and/or mission to be performed, and if there is a high level of satisfaction concerning the project outcome among: key people in parent organization (in which project is carried out), key people in the client organization, key people on

the project team, and key users or clientele of the project effort, the project is considered an overall success."

However, as suggested by Ritz (1994), successful construction project execution is virtually impossible unless you have an effective communication system. Good construction managers with natural flair for human relations consistently had better projects than those without it. Besides, the next most important human relations problem area is the field team's working relationships with each other and with the rest of the company. Ritz (1994) also quoted that:

It takes everybody pulling for you, in addition to a good performance on your part, to have a successful construction project.

Thus, to make it simpler, a project success is all about teamwork. Project and teamwork are interrelated, that is a project depends on the people handling it, and the people handling it depends on each other.

1.2 DEFINITION OF TEAM & TEAMWORK

Teamwork exists in every organization structure, be it formal or informal structure. Without teamwork, an organization may not survive or strive to complete a project. Therefore, it is essential to know that teamwork and organization are

interrelated, that is when there is no teamwork, there is no organization and vice versa. Below are some definitions of team and teamwork.

Team: a) A distinguishable set of two or more individuals who interact dynamically, interdependently and adaptively to achieve specified, shared and valued objectives (Bower et al, Anon 2).

b) A team is a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they are mutually accountable (Katzenbach and Smith, 1993).

c) People working together in a committed way to achieve a common goal or mission. The work is interdependent and team members share responsibility and hold themselves accountable for attaining the results. *(http://web.mit.edu/ist/competency/guide/definitions.html*, Anon 3*)*

d) Team is a group of people working together towards a common goal. *(http://www.teamtechnology.co.uk/tt/t-articl/tb-basic.htm*, Anon 4*)*

Teamwork: a) Co-operation between those who are working together on a task. *(http://www.allwords.com/query.php?SearchType=3&Keyword=teamwork&goquery=Find+it!&Language=ENG*, Anon 5*)*

b) Teamwork implies the intention to work cooperatively with others, working together as opposed to working separately or competitively.

(http://www.gov.sk.ca/psc/MgmtComp/Teamwork.htm#Definition:, Anon 6*)*

c) Cooperative effort by the members of a group or team to achieve a common goal.

(http://education.yahoo.com/reference/dictionary/entry?id=T0073300, Anon 7*)*

By reflecting on all the above, it can be seen how these definitions can be applied to a project team responsible for a project.

1.3 TEAM SKILLS

According to Scott (Anon 8), there are three areas of skills necessary that a team must acquire to carry out the process of management or project management:

- ***Technical skills*** – The ability to use knowledge, methods, techniques, equipment, etc (such as engineering, accounting, machining, or word processing).
- ***Interpersonal skills –*** The ability and judgment in working with and through people. The skills include leadership, communications (verbal, written, listening, presentation), selling, conflict management, negotiation, facilitation, delegation, and team building.
- ***Conceptual skills*** – The ability to understand the complexity of the overall organization and manage the process. The skills are process,

planning, organizational, problem solving, financial, and time management.

Furthermore, as a self-managing unit, a team has to undertake most of the functions of a leader or project manager. According to Koontz (Anon 9), the functions of project managers are as follows:

- ***Planning*** involves selecting missions and objectives and the actions to achieve them; it requires decision-making, which is, choosing future courses of action from among alternatives.
- ***Organizing*** is that part of managing that involves establishing an intentional structure of roles for people to fill in an enterprise.
- ***Staffing*** involves filling, and keeping filled, the positions in the organization structure.
- ***Leading*** is influencing people to strive willingly and enthusiastically with the interpersonal aspect of managing.
- ***Controlling*** is the measuring and correcting of activities of subordinates to ensure that events conform to plans.

Babcock (1996) stated that the engineering manager is distinguished from other managers because he or she possesses both an ability to apply engineering principles and a skill in organizing and directing people and projects. He is uniquely

qualified for two types of jobs: the management of technical functions (such as design or production) in almost any enterprise, or the management of broader functions (such as marketing or top management) in a high-technology enterprise.

1.4 TEAMWORK ORGANIZATION STRUCTURE

There are three basic forms of organization structure found in most companies. They include functional (Fig. 1.1), project (Fig 1.2), and matrix (Fig. 1.3). Below are examples of the three organization structures, respectively.

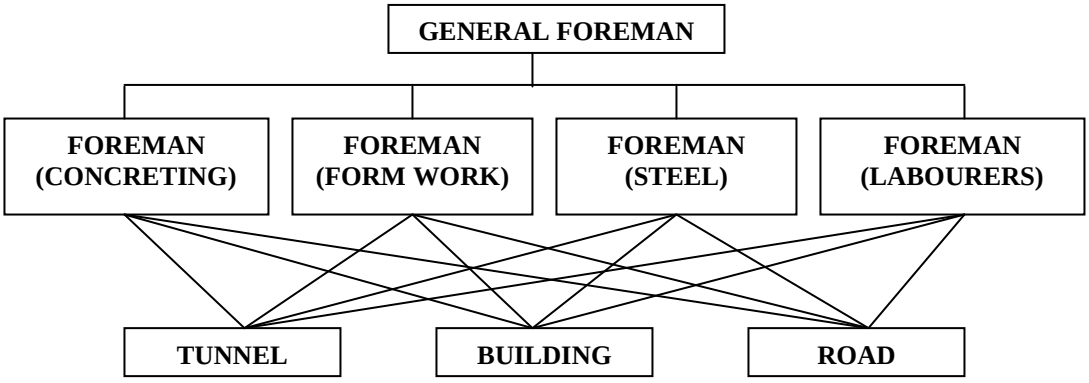

Fig. 1.1 Example of a functional organization
Source: Tang et al, (2003). Modern Construction Project Management. 2nd ed. Hong Kong: Hong Kong University Press.

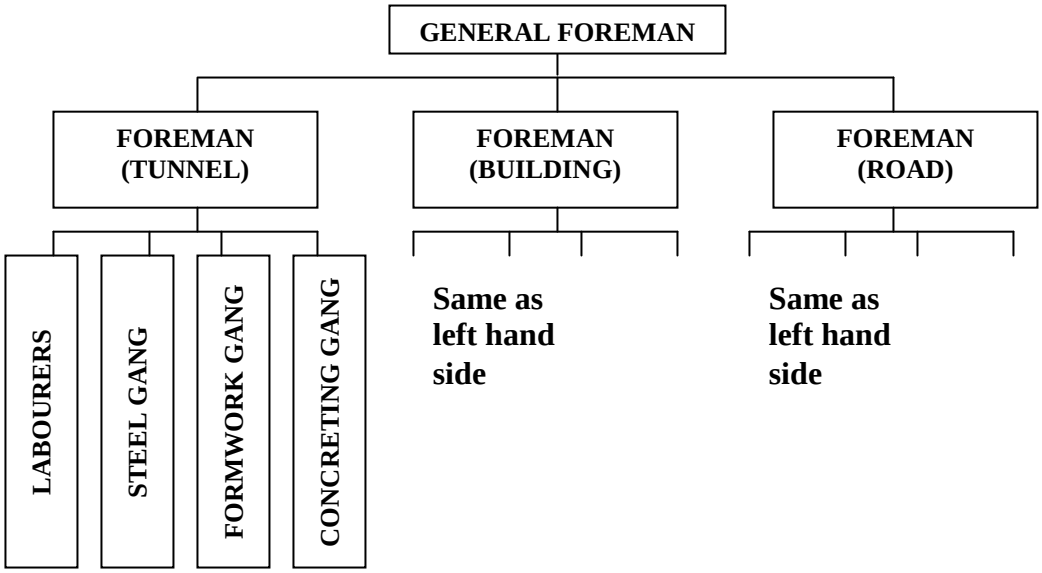

Fig. 1.2 Example of a project organization

Source: Tang et al, (2003). Modern Construction Project Management. 2nd ed. Hong Kong: Hong Kong University Press.

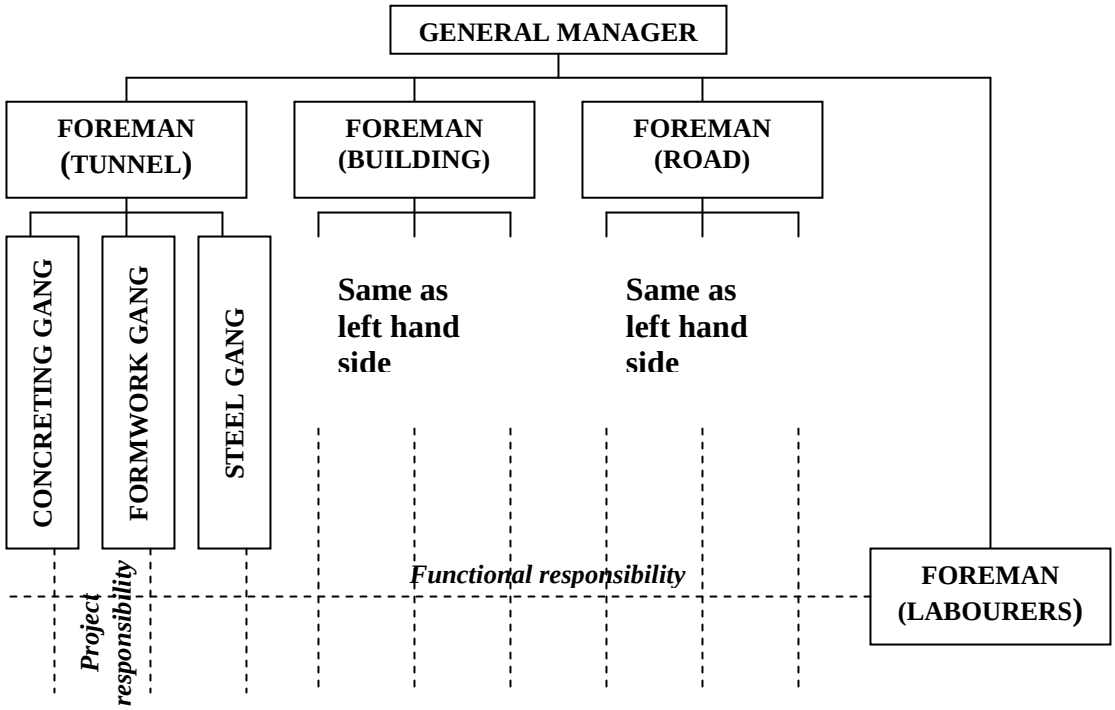

Fig. 1.3 Example of a matrix organization

Source: Tang et al, (2003). Modern Construction Project Management. 2nd ed. Hong Kong: Hong Kong University Press.

1.5 PROBLEM STATEMENT

Indeed the key to a successful project is by having a good and high performing team. However, it is very difficult to have a dynamic, efficient, and high-performance team. The challenges and problems arising in the civil engineering teamwork vary, depending on the culture and structure of the organization. Certainly, there are quite a number of common challenges and problems that are usually faced by the team members. They include:

- Members who do not show up or show up unprepared.
- Members who do not participate.
- Members who wants to do everything themselves.
- Members waste time by off-task talk.
- Members doing unfair share of the work.
- Members who dominate the conversation.
- Ineffective decisions and decision-makings.
- Conflict among team members.
- Lack of commitment by some team members.
- Difficulties in scheduling meeting.
- Lack of clear agenda.

These challenges and problems, more often than not lead to conflicts and disputes among team members. Hence, the question is how we can make our team good and effective.

Successful teamwork is difficult to achieve. To be able to work together, a team must be organized first. For efficient teamwork, clear planning, roles, rules of conduct and good decision-making are necessary. The team leader will need to know which tasks should be undertaken in common, and which should to be allocated to individuals or subgroups based on disciplinary expertise and skills, and also how these tasks can be coordinated. Without good team and teamwork, the project success would be at stake. Thus, it is essential for the team leader to choose the appropriate organization structure for the team. However, the question is the current organization structures adequate for a civil engineering project to be a success?

Furthermore, in order for teamwork to be effective, building a good team that understands the project's objectives and goals is essential to produce good and high performance outputs. That is the team needs to develop a good understanding of the problem statement and the output that the client expects at the end of the project. Besides, team members need to be clearly mandated by their organizations and be given the time and resources to make their contributions to the team. Nonetheless, the current team development models need to be reexamined in order to obtain the optimum performance from the team.

1.6 AIM & OBJECTIVES

This study examines on the teamwork model available in the civil engineering industry from past, to present, and to the future. This study covers on the aspect of organization structures and team development.

Since there have always been challenges and problems arising in teamwork, thus, the aim of this study is to examine whether the team model and the teamwork model are suitable for the civil engineering environments. The objectives are:

- To define teamwork in civil engineering.
- To analyze past teamwork and team organization structure.
- To analyze present teamwork and team organization structure.
- To study the evolvement of teamwork from past to present.
- To look at the strengths and weaknesses of the current team structure.
- To look at the weaknesses, if any, of the team development model (TDM) in civil engineering available currently.
- To project what is the future trend of team, teamwork, and organization structure, and also to improve on the current team model, if necessary.