The Ethical Competency of Civil Engineers in Construction Industry: A Case Study of Penang, Malaysia

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The construction industry in Malaysia today becomes one of the most important industries contributing to Malaysian economic growth. It comes in many different ways depends on the project type, owner’s sophistication, and owner’s time and budget concerns which managed by the owner, designer, and the construction professions. It has been built on the needs of the community to provide shelter, conquer distances, harness energy, create public spaces, protect from natural disasters, and build historical monuments.

To accomplish a specific project, it needs a carefully planned and organized effort which includes defining project goals and objectives, specifying tasks or how goals will be achieved, what resources are needed, and associating budgets and timelines for completion (reference). In a highly competitive business environment, civil engineers are expected to do more with less, grow their revenue, and downsize staff to increase profit.

The ability of the civil engineer to manage every detail aspect plays a major role to minimize and avoid problems from happen. For instance, a supplier unable to supply pipe to the contractor on time and contractor inform to the civil engineer about the matter. How civil engineer response to this problem to avoid delay is important to ensure that the best skilled civil engineers are assigned to the most critical projects and to predict future problem before it occurs. Hence, in a highly competitive business environment, it is important to ensure that the best skilled civil engineers are assigned to the most critical projects and to predict future problem before it occurs.

Keywords: Ethic, competency, civil engineer, characteristics, construction industry

ABSTRACT

Background: As Malaysia progressively marches towards industrialization, the role of the construction industry is greatly enhanced, with the idea of transforming the aspirations and needs of people into reality. However, many projects experienced extensive delays and thereby exceed initial time and cost estimates. How civil engineer response to this problem to avoid delay is important to ensure that the best skilled civil engineers are assigned to the most critical projects and to predict future problem before it occurs.

Objective: To identify the ethical characteristics required to be competent civil engineer and to determine the best current ethical characteristic that civil engineer must have to be competent in construction industry in Penang.

Results: The characteristics are carried out from reference books, journals, relevant web sites, interviews, observations, and data collected by questionnaires as well. The respondents of the survey are among civil engineers under contractor class G6 and G7 based in Penang. The result of the analysis will be compare with the ethical characteristics in literature review to determine the best ethical competency for civil engineer. Most five characteristics that the respondents chose to be very important are responsibility, obligation to profession, teamwork, problem solving, and technical knowledge.

Conclusion: These ethical characteristics will be applied among civil engineer to be competent in order to minimize the problems occur in construction industry.

INTRODUCTION

The construction industry in Malaysia today becomes one of the most important industries contributing to Malaysian economic growth. It comes in many different ways depends on the project type, owner’s sophistication, and owner’s time and budget concerns which managed by the owner, designer, and the construction professions. It has been built on the needs of the community to provide shelter, conquer distances, harness energy, create public spaces, protect from natural disasters, and build historical monuments.

To accomplish a specific project, it needs a carefully planned and organized effort which includes defining project goals and objectives, specifying tasks or how goals will be achieved, what resources are needed, and associating budgets and timelines for completion (reference). In a highly competitive business environment, civil engineers are expected to do more with less, grow their revenue, and downsize staff to increase profit.

The ability of the civil engineer to manage every detail aspect plays a major role to minimize and avoid problems from happen. For instance, a supplier unable to supply pipe to the contractor on time and contractor inform to the civil engineer about the matter. How civil engineer response to this problem to avoid delay is important because when delay happen it will affect the work progress and the cost as well. Construction delays are often responsible for turning profitable projects into loosing ventures. So, it is important to ensure that the best skilled civil engineers are assigned to the most critical projects and to predict future problem before it occurs.

Merriam-Webster’s Collegiate Dictionary (2001) defines ethics as “the discipline dealing with what is good and bad and with moral duty and obligation.” In practical terms, it is the qualified application of the moral values and beliefs of an individual or an organization. The purpose and function of ethics in civil engineering discipline has changed over time with the setup changes and controls in education and learning, standardization,
and enforcement as well as the altering characteristics of ethical problems throughout different instances (Forister, 2003).

Being a qualified and professional in the field signifies obligation for perform that extends above solely self-interest (and over and above the individual interests of the employer when necessary) and beyond the prerequisites of legal procedure or regulation. Ethics can become a constructive power for creativity and innovation by motivating a re-shaping of the environment via ‘Value sensitive design’ in order to fulfill contradictory demands and requirements (Hoven et al, 2012).

For quite a while, civil engineers have announced the insufficiency of investment in sustaining and improving the infrastructure. Some of those shortcomings have been disastrously outlined by the loss of life and devastation generated by downfalls in which engineering designs, government funding, and the community oversight systems were all entitled into issues. Civil engineers are extremely aware of the implications for public health, safety, and welfare whenever the infrastructure will not obtain the necessary attentions (ASCE, 2007). In the construction industry, it is being significantly obvious that competency-based measures facilitate the process of evaluation the professional civil engineers and practitioners in the industry (Dainty et al., 2004; Skipper and Bell, 2006). Presently, there is an increasing attention on the relationship between conducting projects successfully and construction project managers as well as civil engineers’ ethical competences (Cheng et al, 2005). In contrast to the functional competences, which measure performance against the achieved output-based components, ethical-competency set up on critical behavioral metrics, underlie outstanding degrees of overall performance (Dainty et al., 2004). In fact, ethical competency-based procedures likewise have taken the possibilities for building the psychological and emotional understanding necessary while evaluating and forecasting human performance (Motowidlo et al, 1997). Consequently, the ethical measures may assist civil engineers to contribute more efficiently toward their individual growth and therefore, achieve better organizational accomplishments. Hence, identifying and integrating ethical measures into civil engineers’ performance should possibly assist toward engendering their performance quality (Dainty et al., 2003). Also, economic constraints and local interests have made it much more difficult for many civil engineering professionals to adhere to the clear ethical principles of formulation and adherence to a set of values or beliefs; a core component of social and technical progress (Hodgkinson & Sohail, 2003).

However, all the staffs and particularly the civil engineers in the construction industry require performing under the ethical code, which is provided by the organizations. A code of ethics of an organization is a code of honor or a declaration of quality standards predetermined to by mutual understanding of the organization’s members. It is a consensus agreement and is accepted by all members of the organization as a condition of a regular membership. Its objective is to set up organizational authority to willpower individual members. Many of civil engineers contributing in construction projects work for organizations that have codified ethics for the mutual benefit of their members. Nevertheless, there are some individuals contributing in construction projects that fail to find themselves to work in any structured group or that are members of organizations that do not feature any codes of ethics (Iffland, 1994). Accordingly, the code of ethics, particularly for civil engineers, in most organizations emphasis on some fundamental principles in order to uphold and advance the integrity, honor and dignity of the engineering profession by:

1. Employing their expertise and abilities with regard to the development of human welfare;
2. Indeed being sincere and unbiased toward providing with faithfulness the community, their employers, clients and other stakeholders;
3. Attempting to enhance the competence and prestige of the engineering profession; and
4. Promoting the professional technical societies of their disciplines.

Nowadays, civil engineers experience more ethical dilemmas than ever before. In both the public and private sectors, the effective economy and innovative funding mechanisms guarantee that the organization and the engineers are operating productively. With the emergence of fast-track scheduling, new pressure is placed upon the civil engineers to accomplish the project in less time and within approximately same budget without sacrificing the quality of the tasks.

Professional challenges, disagreements, dichotomies and dilemmas are inevitable and taking an ethical view can help inform decision-making and be the source of technological development rather than a constraint (Hoven et al, 2012).

By development of the size and number of construction projects, particularly in developing countries, such as Malaysia, final ethical challenge to today’s civil engineers seem to be highly critical. The engineering achievements of yesterday have fulfilled or exceeded their design lives or have simply been outstripped by demand. In today’s construction practices, engineers need to conquer issues such as subterranean utilities spreading and geotechnical issues while still using current services and facilities intact during construction projects and challenging with time, cost and quality constraints. Consequently, civil engineers have no place for fault through accomplishment the project tasks. On the other hand, competition in the global marketplace requiring high ethical standards. Less industrialized countries and cultures often have different views about extortion, nepotism, bribery, and lower health and safety standards. Accordingly, experienced engineers must
use their knowledge and skills to bring the impoverished culture to a higher level rather than succumbing to these practices.

Additional challenge will be reliance on technological advances in equipment in both design and construction. Nowadays, the employ of IT and computer programs that will probably “do everything for you” is absolutely no exchange for uncomprehending of the fundamental concepts and firm engineering judgment. However, the development and application of ethics in civil engineering has greatly increased in USA over 150 years ago. For instance, in US college qualification is reliant upon inclusion of ethical training in the engineering programs. Nevertheless, the ethical pushes inquired to the civil engineers have also amplified in difficulty and will continue to be tougher into the future. It seems the education and learning of ethics throughout engineering concepts, provide ethical standards by professional societies, and therefore, enforcement of penalties by board of authorities, the great operates of civil engineering activities will be guaranteed for all time in all works.

The purpose of this paper is to examine those ethical codes are available in the literature and those are practice in the organizations. Furthermore, the study evaluates the relationship of ethical competency of civil engineers to quality in the construction projects of Penang.

**Methodology:**

The method applied in this case is an action research oriented approach. It describes the procedure of data collection from articles, journals, construction management reference book and related web sites as well. The characteristics of action research are that it centers on addressing practical issues or problems, questionnaires, and data analysis. The research of this study is divided into five stages which are problem statement, identify objectives, gathering information, results and data analysis, and conclusions and recommendations.

Stage one is the problem statement where to understand what problems occurred and why this research should be done and how the research takes effect of the problem statement. In this stage, problem statement and scope of study should be clear and must relate with the objective and state the possible outcomes in the end of this study. The scope of this study is in Penang where to study the major problem occurring in construction industry and how to minimize the problem.

In stage two, the objective should be clear and detailed and it must relate with problem. The main objectives of this study are to identify the ethical characteristics required to be a competence civil engineer and to determine the best current ethical characteristic that civil engineer must have to be competence in construction industry.

Gathering information and design questionnaire in stage three where comprehensive reviews of relevant materials from construction management reference book, the latest referred journals, articles and related websites are carried out. The questionnaires are designed including the suggested ethical competencies needs to be competent civil engineer in construction industry. It will be distribute among civil engineers under contractor class G6 and G7 in Penang. It focused on the importance of personal and professional characteristics under ethical competency. Most of the questions were of the closed type and were designed to elicit qualitative information. The respondents were requested to rate the relative importance of each listed in the question a rate according to a five-point scale that is: 1-Not important at all to 5-very important.

Stage four discusses the significant findings of the study. Data gained from the questionnaires will be analyzed to determine the best current ethical characteristics needed to be competent civil engineer in construction industry. Statistical Package for the Social Sciences (SPSS) software will be used to find the best level of importance and to determine the frequent scale chosen by the respondents.

In stage five, the conclusion and recommendations where reviews over this study are made and some recommendations were suggested to improve this study for future research emerge.

**RESULT AND DISCUSSION**

The data collected from the questionnaires were analyzed and after comparison made between stated in literature review and project research, there was some different changes between literature review and project research as expected. In literature review, the best five characteristics has change its placed in the view of the respondent. One of the reasons is because respondents are among civil engineer while in literature review it is more focused on project management skills. The comparison is shown in Table 3.1 on the next page.

In project research, responsibility and obligation to profession rise in the highest current implementation because in construction industry, there are many factors contribute to serious problem such as financial, coordinating problems, and external factors (lack of materials, equipment and tools, poor site conditions, poor weather condition, and transportation delays). Only a person willing to take responsibility for their actions and professions, and the resulting consequences, will be able to ensure that their actions conform to universal human principles.
Table 3.1: Comparison of ethical competency between literature review and project research.

<table>
<thead>
<tr>
<th>No.</th>
<th>Literature Review</th>
<th>Project Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Awareness</td>
<td>Responsibility</td>
</tr>
<tr>
<td>2</td>
<td>Technical knowledge</td>
<td>Obligation to profession</td>
</tr>
<tr>
<td>3</td>
<td>Ethical behavior</td>
<td>Teamwork</td>
</tr>
<tr>
<td>4</td>
<td>Morality</td>
<td>Problem solving</td>
</tr>
<tr>
<td>5</td>
<td>Confident</td>
<td>Technical knowledge</td>
</tr>
<tr>
<td>6</td>
<td>Comply with Code of Ethic</td>
<td>Communication skill</td>
</tr>
<tr>
<td>7</td>
<td>Responsibility</td>
<td>Trouble shooting</td>
</tr>
<tr>
<td>8</td>
<td>Creative and ethical thinking</td>
<td>Confident</td>
</tr>
<tr>
<td>9</td>
<td>Integrity, honor and dignity</td>
<td>Integrity, honor, and dignity</td>
</tr>
<tr>
<td>10</td>
<td>Ethical knowledge</td>
<td>Comply with Code of Ethic</td>
</tr>
<tr>
<td>11</td>
<td>Ethical decision making</td>
<td>Ethical decision making</td>
</tr>
<tr>
<td>12</td>
<td>Communication skill</td>
<td>Awareness</td>
</tr>
<tr>
<td>13</td>
<td>Problem solving</td>
<td>Resilient</td>
</tr>
<tr>
<td>14</td>
<td>Trouble shooting</td>
<td>Ethical behavior</td>
</tr>
<tr>
<td>15</td>
<td>Fairness</td>
<td>Creative and ethical thinking</td>
</tr>
<tr>
<td>16</td>
<td>Resilient</td>
<td>Ethical knowledge</td>
</tr>
<tr>
<td>17</td>
<td>Optimistic</td>
<td>Risk management</td>
</tr>
<tr>
<td>18</td>
<td>Risk management</td>
<td>Fairness</td>
</tr>
<tr>
<td>19</td>
<td>Team work</td>
<td>Morality</td>
</tr>
<tr>
<td>20</td>
<td>Obligation to profession</td>
<td>Optimistic</td>
</tr>
</tbody>
</table>

While in the view of respondents, it is very important for civil engineer to be responsible with every detailed work they have done because it is their fault if something goes wrong. In addition, obligation to profession is very important to avoid all conduct or practice which is likely to discredit the profession or deceive the public.

Then the priorities followed by teamwork, problem solving, and technical knowledge. This changes due to the usage of latest methods and modern technologies such as IBS, increase skills in terms of value add and moving up the value chain that will help developing construction sector. By applying the latest technology in construction industry, civil engineers should enhance their technical knowledge and skills in solving problems to increase competitive edge and use it for the enhancement for human welfare.

Teamwork is important no matter whether working in big or smaller team. As one of the respondents said, teamwork among project team is very important for instance if a major problem occurs at the site, engineer must deal with client and the project team to achieve better solution and avoiding any argument that can cause conflict.

Every problem occurred must solve with ethics to avoid argument. One of the respondents stated that problem solving in construction industry is very wide including ethical issue as well as it appears to be problem at the site. Another respondent state that this characteristic also shows the ability of civil engineer in predicting some problem before it happens.

While in literature review, it focused more on project manager skills which can consists of architect, engineer, or management team. The highest rated characteristics for effective project managers and project success were awareness, technical knowledge, ethical behavior, morality and confident. This team involved in management such as planning, organizing, programming, coordinating, and controlling. In project management, it is vital that project management professionals conduct their work in an ethical manner to earn and maintain the confidence of team members, colleagues, employees, employers, clients, and the public.

**Conclusion:**

The main objective in this research is to determine the best current ethical characteristics that civil engineer must have to be competent in construction industry. This research is done based on the results from the questionnaire to targeted respondents, by interviews, and observations in construction industry and finished within the timeline.

The outcome of the result showed some differences from literature review. From the survey most of the ethical competencies of civil engineer are under contractor company while in the literature review, most of researchers focused on project management skill. From this comparison we can see that responsibility is very important for the civil engineer to apply in construction industry. This is follow by obligation to profession, teamwork, problem solving, and technical knowledge.

These ethical characteristics will be used as a reference and guidance among civil engineer to be competent in order to minimize the problems occur in construction industry. Each civil engineer decides the ethical standards by which he or she lives and which he or she practices in their profession. There are only two points when it comes to ethics where the first is to have a standard and follow and the second is the will to follow it. (Veach, C.M. 2006).
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