

Role of Engineering Ethics in Construction Execution and Completion

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ABSTRACT

The main objective of this paper is to analyse the current issues related to unethical behaviours in the construction industry. This research will discover the law acting on the cases of bribery, money laundering, cheating and corruption. The case study area focuses on Malaysia's construction industry. Suggestions and recommendations are addressed in preventing unethical behavior from occurring. This paper is a comprehensive review paper where several past papers, journals, articles, newspapers and websites were analysed to collect information on the case topic. Databases such as Google Scholar, Scopus, IEEE, and Science Direct were used as primary sources. The paper presents the latest cases relating to unethical behaviour in the construction industry including, engineers, project managers and project directors between the years 2017 to 2023. The effect of the unethical behaviour was also discussed and explained in three different aspects which are individual, organization and nation. Lastly, three (3) recommendations for encountering immoral behaviour in the construction industry were clearly stated which are "Reporting Suspicious Transaction", "Internal Audit", and "Whistle-blowing system". As a result, this paper has successfully proven that engineering ethics plays a significant role in construction execution and completion. This paper analysed 48 papers from reliable sources to prove the role of engineering ethics in construction execution and completion.

Keywords: Engineering ethics, unethical behaviour, construction execution, completion

INTRODUCTION

Engineering ethics is a professional subject that must be developed in a professional setting, such as a professional school, rather than being taught on one's own (Charles Edwin Harris Jr. et al., 1996). The introduction of engineering ethics exposes future engineers to real engineering problems either in the corporate setting, or construction site situation (Roland Schinzinger, 2000). For example, in the year 2000, MIT's Mechanical Engineering Department taught the students about ethics when the management of the department decided the students to contact companies to help the employees that facing ethical issues in their design projects (Lynch & Kline, 2000). The integration of engineering ethics has a crucial significance in the implementation and finalization of any project including construction projects.

Ethical Challenges

Zhu et al. (2020), claim that it provides a framework of moral principles that direct engineers in their careers and academic investigations. These principles function as a framework for determining values and evaluating

criteria in engineering building tasks. An integral component of engineering ethics pertains to the significance of executive ethical leadership. The process entails utilizing communication and the implementation of a reward system to effectively steer ethical conduct (Treviño et al., 2003). By advocating for ethical leadership, construction projects can establish mechanisms to uphold ethical standards during the execution and completion phases. Ethics education and training are crucial factors in fostering ethical conduct within the construction industry.

Bribery and corruption are examples of unethical actions that have an impact on the construction world. Due to varying business structures and government clients, research has revealed that corruption within the construction industry can vary greatly by sub-sector or region within a country (Kenny, 2009). Moreover, it has been determined that the culture of construction companies and the structure of the sector encourage fraud and corruption (Arewa & Farrell, 2015). According to Transparency International, one of the primary unethical behaviours in the construction industry is corruption (Kalyongwe et al., 2018). Furthermore, the building industry has come under fire for its involvement in bribery, environmental damage, capital flight, risky business practices, subpar work, and whistle-blowing (Luqman Oyekunle Oyewobi et al., 2011). Investigations into the efficacy of response tactics for corruption vulnerabilities in developing nations' public construction sectors have also brought attention to the industry's pervasive corruption (Shan et al., 2015). One common issue influencing the ethical conduct of construction professionals in Nigeria has been found as the lack of sufficient ethical training programmes and a reward system for professionals who adhere to good ethical practices (Okwudili Maduekeh et al., 2022). In Nigeria, the building sector has also been linked to immoral activities like quackery, social corruption, and political influence in contract awarding (Akintola et al., 2020).

Promoting Ethical Practices

Thus, to solve the issue, several researchers have shown that the best way to improve ethical behaviours in the industry is to incorporate ethics education into primary schools, undergraduate programmed in construction and engineering, and ethics training for professional institutions through continuous professional development (CPD). (Mohamad et al., 2015). By giving construction professionals the knowledge and abilities, they need to make moral decisions, ethics education and training significantly contribute to the ethical execution and completion of construction projects. In addition, the utilization of ethical rules and guidelines is a significant facet of engineering ethics within the realm of construction. Corporate codes of ethics are commonly established by international construction organizations to delineate the anticipated ethical behaviour across different phases of a project, including conception, design, tendering, execution, supervision, and handover (Erbaş, 2018). These guidelines facilitate the identification and resolution of potential instances of ethical misconduct, thereby guaranteeing that construction projects are carried out and concluded ethically.

In conjunction with codes of ethics, decision-making models can provide valuable assistance to construction professionals in the resolution of ethical difficulties. An instance of this can be observed in the work of (Fan & Law, 2012), where the Hong Kong Institution of Engineers (HKIE) has formulated the ETHICS PLUS decision-making model with a particular focus on those working in the construction and engineering sectors. This model presents a conceptual framework that enables professionals to apply their judgment and exercise discretion when confronted with ethical challenges within the context of their work environment. Engineering ethics plays a crucial and indispensable part in the implementation and ultimate achievement of construction projects. The aforementioned framework offers a collection of moral concepts, fosters the development of ethical leadership, places significant emphasis on ethics education and training, and employs codes of ethics and decision-making models to guarantee that construction professionals adhere to ethical standards throughout the whole project lifetime.

However, if any necessary outcomes are to be guaranteed, this enforcement must be based on a genuine and valuable understanding of the nature, inspiration, and manifestation of unethical behaviour. Among other significant parties, there is a conflict involving the owner, contractor, and engineer. All indications point to the construction sector needing more ethical practice than at any previous moment in history, but professional

misconduct has increased and there is a significant gap between professional behaviour and moral obligations. This study aims to investigate the moral dilemmas in the construction business and provide a description of unethical conditions there. Therefore, the analysis of unethical behaviour and the recommendations for preventive actions are the key objectives of this study.

METHODOLOGY

In investigating, assessing, and critically evaluating ethical problems in the areas of civil engineering as well as potential solutions, a methodical literature study is being used. To choose trustworthy articles and papers for review and analysis, a literature review is performed. The selection of articles and reports is based on three criteria:

1. the article or report should originate from reputable sources
2. the study ought to identify ethical behaviour in civil engineering field
3. the study must address issues in the construction industry from project execution to project completion.

Throughout the journal completion, ScienceDirect, Scopus, IEEE, Google Scholar, newspaper articles, and websites from various organisations were used as primary sources. The search phrases include several keywords, including "ethics," "unethical behaviours," "ethical issues," "building industry," "bribery," "corruption," "cheating," "contractors," "civil engineers," and "corrupted construction company."

Consequently, this research has gathered scholarly articles and studies about unethical behaviour in the construction sector, the impact of unethical behaviour on individuals, families, businesses, and the nation, and several solutions to tackle the issues. The goals of the publication were reinforced by the utilisation of survey data from other scholars who were involved in the topic. To better future study on the role of engineering ethics in the execution and completion of building, limitations and problems were stated. All of these sources' information is combined, and in the parts that follow, specific observations are covered in detail. Figure 1 shows the research flow chart for this study.

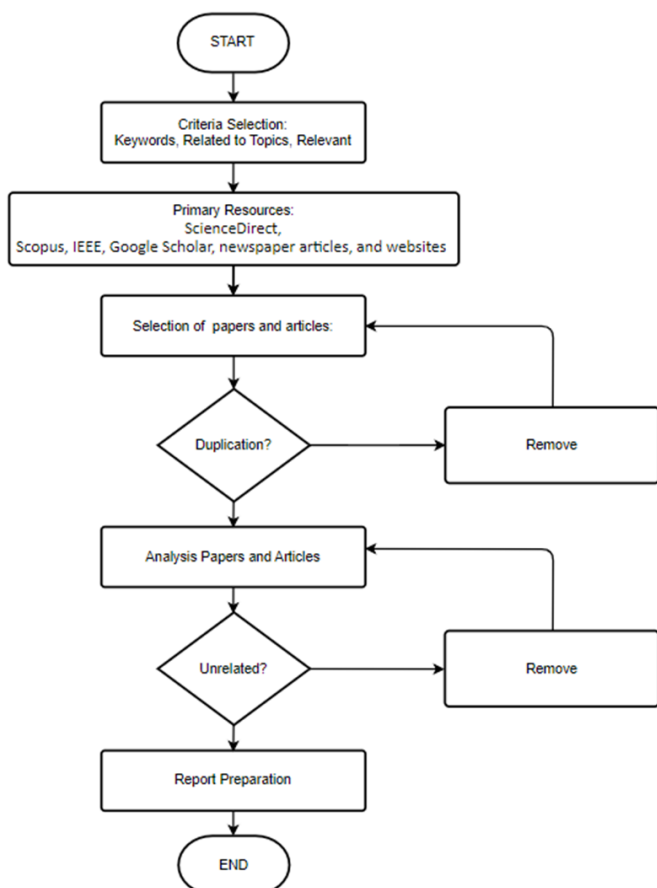


Figure 1 : Research Flow Chart

FINDINGS

Unethical Issues in Malaysia’s construction industry

A construction firm manager faces three charges in 2022 for allegedly paying a civil servant a total of RM14,000 in bribes in 2019. The manager is charged with providing bribes to an engineering assistant to obtain further work approval and permission for repairs at Sekolah Menengah Hulu Selangor, Maktab Police Kuala Kubu Bharu, and the women's dormitory at Darul Quran. According to Section 17(b) of the Malaysian Anti-Corruption Commission (MACC) Act 2009, he faces a maximum punishment of 20 years in prison and a fine of no more than five times the entire amount of bribes, or RM10,000, whichever is higher. According to a research by Zahratulhayat Mat Arif (2022), back in 2021, the manager bribes RM 10,000 to get road project repairs.

A director of a construction company involved in the Mass Rapid Transit (MRT) line project was charged with two counts totalling SDG650000 (RM2.158 million) for bribery and one charge totalling RM4.13 million for money laundering. The chief executive officer of the MRT was offered an incentive by the director to verify that Colas Rail System, Engineering Sdn Bhd, was capable of carrying out the MRT Line Two Project. In Bernama (2023), if it is confirmed that the director is offering bribes, the director faces a maximum 20-year prison sentence and a fine of at least five times the value of the bribes, or RM10000, whichever is larger.

An engineer employed by the Public Works Department (JKR) was accused of moneylaundering, receiving bribes, and cheating in three (3) major cases in 2023. The total amount of money involved in this unethical action by the engineer was RM131600 (“JKR Engineer Charged with Money Laundering, Cheating, Corruption Involving RM131,600,” 2023). This amount was RM68600, RM 43000, and RM 10000, respectively. When the engineer gave a man instruction to transfer money from an SBR Consultant to a woman's account, the engineer was accused of money laundering. After suggesting to guarantee the subcontractor wins the slope maintenance project, the engineer was accused of receiving bribes when he accepted a sum of money as a gift. Finally, when a guy is duped by an engineer's dishonest recommendation of Paradigm Jitu Enterprise, the engineer is charged with cheating. Table 1 shows the cases accused related to unethical behavior in construction industry from 2017 to 2023.

Table 1 : Cases accused related to unethical behavior in construction industry from 2017 to 2023

Cases	Unethical Behaviour	Law	Court Sentence
Money Laundering	Giving a man instruction to move RM 68600 from an SBR Consultant bank account to a woman's Maybank account.	Section 4 (1) (a) of Anti-Money Laundering	<ul style="list-style-type: none"> · 15-years prison term · Penalty of at least five times the sum, or RM5mil (higher will be chosen)
Accepting Bribes	Accept RM 43000 from Normas Resources	Section 16(a)(A) of the Malaysian Anti-Corruption Commission Act 2009	<ul style="list-style-type: none"> · 20-years prison term · A penalty of at least five times the bribery amount
Cheating	Conceive a man into believing that Paradigm Jitu Enterprise is the right alternative for slope design consulting services.	Section 417 of the Penal Code	<ul style="list-style-type: none"> · 5-years prison term · Penalty · Or both

Impact of Unethical Behaviours in Construction Execution and Completion

Individual

Unethical behaviour in the construction industry can have far-reaching consequences for individuals involved in the execution and completion of projects. According to research by Ameyaw et al., 2017; “Effect of Bid

Shopping on Public Building Project Delivery in Bauchi Metropolis,” (2022), contractors, public officials, and construction professionals frequently engage in unethical practices like bribery, corruption, and collusive tendering at different phases of a construction project.

As stated in Zulu & Muleya (2019), these unethical actions may result in costly projects, poor-quality construction, abandoned or collapsing buildings, and wasted opportunities for the local community. Furthermore, in Dantong Jack Sam (2017), unethical behaviour can lead to skewed construction procedures, obstacles to supply and demand, inflated contract amounts, uncertainty in tenders, delays, cost overruns, and poor workmanship, all of which can erode public confidence in the competence of professionals. According to Amoah & Steyn (2022), unethical behaviour can result in lost bid prices, higher project expenses, financial harm, criminal charges, fines, and reputational problems for construction companies.

The effects of unethical behaviour extend beyond the building process and affect how well projects are completed. In a study conducted by Akinrata et al (2020), it stated the quality of projects can be negatively impacted by the unethical behaviour of quantity surveyors and other experts, which can compromise customer satisfaction and safety. Furthermore, in Shah & Alotaibi (2018), unethical behaviour can negatively impact the quality of products produced, the trust that investors have in the construction sector, and the financial success of public projects.

Organization

In the construction industry, unethical behaviour of an organization in a construction company can have a serious impact on the start and finish of a project. As stated in Shah & Alotaibi (2018), professionals with conflicting interests, including project managers for clients and contractors, site engineers, quantity surveyors, and designers/architects, are particularly vulnerable to unethical behaviour, which has a negative effect on the quality of products produced, the trust of clients, and the confidence of investors in the construction sector. Furthermore, in Zulkifli Ibrahim et al. (2019), unethical behaviour can result in collusive tendering, environmental ethics violations, corruption, incompetence, unfair conduct, favoritism, harsh rules, conflict of interest, and an overriding influence on audit processes over contracting processes.

Unethical behaviour has an influence on the reputation and brand equity of the participating companies as well as the quality and integrity of building projects according to Rezazadeh Baei & Rahmani (2015). It may cause customers to become sceptical about the service industry, which could harm the company's reputation and stakeholders' trust as stated in Özdemir & Akçay (2021). Moreover, the company may face legal and financial penalties for unethical action, in addition to harm to its standing with customers, investors, and the general public.

Nation

The economy and society of a nation can suffer greatly from unethical behaviour in the construction sector. In a study conducted by Aduwo et al. (2020), understanding how e-procurement can assist in checking the prevalence of corrupt and unethical activities in construction project delivery is crucial, especially in places like sub-Saharan Africa where there is a large level of corruption and unethical practices in the procurement process. From a consultant's perspective as stated in Shah & Alotaibi (2018), unethical behaviour in the construction sector is encouraged by factors like poor supervision, bribery, and lack of monitoring. Furthermore, according to Vee & Skitmore (2003), the industry has seen or suffered a variety of unethical behaviours, such as fraud, bribery, collusive tendering, negligence, unfair conduct, and conflict of interest.

In the study by Luqman Oyekunle Oyewobi et al. (2011), corruption and unethical behaviour in the construction industry often skew the process and negatively impact financial success. Akintola et al. (2020) found that illegal practices in the Nigerian construction sector include the use of non-professionals, politics in contract awarding, societal corruption, and quack medicine. In Ameh & Odusami (2010), there's a growing understanding that the construction business faces serious issues due to widespread corruption and other

unethical behaviours. According to Transparency International, one of the most common unethical behaviours in the construction business is corruption, a topic that is well-known within the sector as stated in Kalyongwe et al. (2018).

In a study conducted by Johnson et al. (2015), it is proven unethical behaviour have historically affected the construction sector, resulting in decreased construction quality, financial harm, reputation damage, and higher hazards to public health and safety. According to Li et al. (2022), the complexity and variability of the elements influencing corruption in construction projects highlight the importance of investigating the dynamic evolutionary relationship between the analysis of the law of illegal behaviour in construction projects and this legislation. In addition to creating a dangerous and stressful working atmosphere, Cheng et al. (2022) stated that unethical activity in the construction sector can negatively impact employee well-being.

Recommendation and Suggestion

Based on a survey that had been conducted 43% voted for corporate control, 38% for corporate culture and 19% voted for beyond the influence of management. Under corporate control, factors that are being selected as methods to identify economic crime under engineering and construction organizations are suspicious transaction reporting, internal audit (routine), fraud risk management, data analytic, corporate security and rotation of personnel. The corporate culture such as the whistle-blowing system also one of the methods to detect economic crimes that happen within the company. Figure 2 illustrates the method to identify the economic crime in engineering and construction organization.

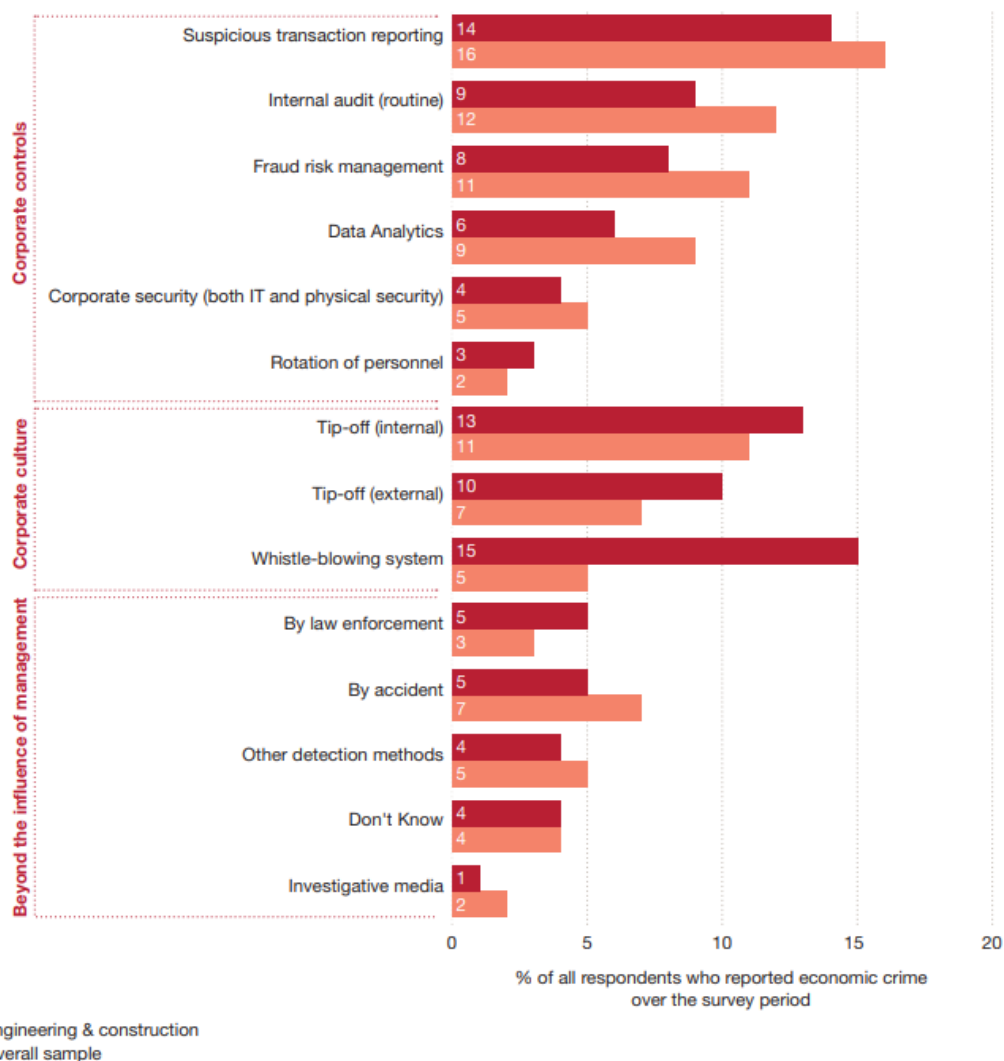


Figure 2 : Illustrates the method to identify the economic crime in engineering and construction organization.

Solution 1: Report Suspicious Transaction

In the construction sector, suspicious transaction reporting is essential to the decrease of economic crime. Any transaction that raises the possibility of money laundering or other illegal dealings must be reported by financial institutions. The Anti-Money Laundering/Combating the Financing of Terrorism regime, risk awareness, and risk management strategy compliance are evaluated through the examination of suspicious transaction reports as stated in Sergunina (2021). Moreover, the results can help banks oversee and manage the deployment of the method for reporting suspicious transactions as Chan et al. (2020) stated. According to Gowhor (2022), these tools include credit rating evaluations, numerous common and industry-specific indications, Know Your Customer (KYC) paperwork, Suspicious Activity Reporting (SAR), Suspicious Transaction Reporting (STR), and Customer Due Diligence (CDD)/Enhanced Due Diligence (EDD) documentation. Research by Ahmad Mahmud & Ismail (2021), has demonstrated a noteworthy correlation between reporting suspicious transactions and money laundering, underscoring the efficacy of this strategy in preventing financial cases.

Solution 2: Internal Audit

When it comes to detecting and dealing with unethical behaviour in the construction sector, internal audit is essential. In Julianty et al. (2022), the construction industry is vulnerable to a range of unethical behaviours, such as bribery, financial fraud, and procurement fraud. From project planning to project execution to project service life, illegal conduct can happen at any point in a construction project as Shamsudeen Abdulazeez et al. (2021) stated. In the study conducted by Yussuf et al. (2022), in the procurement process, in particular, internal audit services play a critical role in identifying and avoiding unethical behaviour by identifying and mitigating procurement fraud and related risks.. Furthermore, internal audit has the potential to decrease the probability of unethical behaviour by improving accountability and transparency as Ma'ayan & Carmeli (2016) stated.

Solution 3: Whistle-blowing system

In a study conducted by Anita et al. (2021), it has been established that one of the most effective ways to stop and deal with unethical behaviour in organizations is through whistle blowing. Unethical behaviour in the construction sector, such as biased tendering and unethical tendering procedures, is a major problem as stated by Ameh & Odusami (2010). In Shamsudeen Abdulazeez et al. (2021), every stage of a construction project, from design to execution and service life, is susceptible to unethical acts. According to Luqman Oyekunle Oyewobi et al. (2011), whistle blowing is a crucial weapon for tackling the issues of corruption, environmental degradation, and poor quality that have been revealed in the construction industry.

In a study conducted by Yunus & Kemalasari (2023), establishing a whistle-blower programme in the construction sector is essential to fostering an atmosphere where workers feel comfortable disclosing misconduct or unethical activity. According to research by Wiisak et al. (2023), whistle blowing is acknowledged as an internal control method to stop organizational illegal actions and is a crucial component of solving fraudulent activity. Moreover, as stated by Smaili (2023), whistle blowing starts when someone notices unethical or unlawful behaviour occurring within the company.

According to Vee & Skitmore (2003), the construction sector also has to deal with issues like public relations and ethical rules that are connected to professional ethics. It is essential to integrate whistleblowing into workplace culture to promote the revelation of unethical behaviour as stated by Dorasamy (2012). Moreover, a whistle blowing system can be implemented, which is crucial for good governance, to address unethical behaviours in the construction business.

CONCLUSION

This paper highlighted several contributions to the research on unethical behaviour in the construction industry in the stage from the execution up to the completion of the project. Based on the research, it is found that there

are several examples of unethical behaviour which are bribery, corruption, money laundering, cheating and many more. All of these happen due to greediness and the desire of an individual or organization toward money to have a luxurious lifestyle. Immoral behaviour may affect the individual as a person, the organization and lastly the country. For instance, acting unethically result in monetary losses, harmed project quality, safety risks, and a decline in the public's trust in the construction industry. In addition, unethical behaviour in the construction sector negatively impacts project execution and completion in a variety of ways, including negatively impacting quality and safety, incurring legal and financial consequences, harming the company's reputation, and deteriorating relationships with stakeholders. Last but not least, immoral behaviour in the building sector can seriously harm a nation's ability to thrive economically, maintain public safety, and promote communal cohesion. The reputation of the construction industry will be indirectly impacted, which will cause the economy to become unstable and result in fewer investments Therefore, this paper has addressed three main solutions to encountering the issues which are reporting any suspicious transaction happening in the company, conducting internal audit and using a whistle blower system. The recommended solution is a preventive solution since prevention is better than cure. To sum up, this paper has proven that engineering ethics plays a significant role in construction execution and completion.

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