

Investigating the effect of poor communication in terms of cost and time overruns in the construction industry

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ABSTRACT

Cost and time overruns are major issues faced by the construction industry worldwide. Studies have shown that various factors cause these overruns. One of the critical factors that cause these overruns is poor communication. This study aims to study and measure the severity of poor communication in causing cost and time overruns in construction projects. The study adopted two consecutive approaches to study the effect of poor communication in causing cost and time overruns. The first approach was to conduct an extensive literature review to extract causative factors from diverse construction industries that consider poor communication as a causative factor, then to determine its severity percentage, among other factors for each study. From the analysis, it can be concluded that developed countries that apply information communication technology and advanced communication systems have lower severity percentages compared to other countries. The second approach was to conduct a qualitative study by interviewing construction experts and to examine their comments and criticisms of the results obtained from the literature. Experts were asked to highlight their views on the severity of poor communication in the construction industry. The outcome of these interviews was thematically analysed. The findings show that poor communication has a significant effect on cost and time overruns in construction projects.

KEYWORDS: Construction Industry, Cost Overrun, Poor Communication, Time Overrun.

INTRODUCTION

The term poor communication has been used by researchers in the construction industry to describe the phenomenon of ineffective communication in the domain of construction projects (Gamil & Rahman, 2018). According to Hoezen, Reyman & Dewulf (2006), the word 'poor' is also used to describe the improper and lack of communication among construction stakeholders. Furthermore, the British Standard Institution (BSI, 2003) used the word poor as a general term to describe the inefficient communication and improper sharing of information in the construction project industry. In addition to that, Dainty, Moore and Murray (2006) used the term poor to articulate the concept of inappropriate and ineffective project communication and information exchange among construction teams.

The project management body of knowledge considers communication to be an essential element in construction management, which mainly aims to achieve timely, suitable source, assortment, storage, distribution and arrangement of construction project information (Rose, 2013). Researchers have strongly contested these findings. According to Dainty *et al.* (2006), successful communication is essential to smooth the process of monitoring and to coordinate

the activities during the life cycle of any construction project. Besides, it connects people's ideas and information to achieve the success of the project. Hence, everyone involved in a project must be prepared to send, receive and understand how communication is being managed, coordinated and performed (Rose, 2013).

According to the Project Management Institute (PMI) annual report published in 2013, approximately more than half of the project stipulated budgets are at risk due to ineffective and improper project communication. The PMI also declared that companies allocate \$135 million for every \$1 billion spent on a project for risk and jeopardy. It was pointed out that \$75 million of that \$135 million, which is approximately 56% of the total project cost, is placed at risk by improper and poor communication. Additionally, it was emphasised that poor, lacking and substandard communication is the primary contributor to project failure and has a negative impact on project success. The report suggested that high-level and executable communications strategies are essential to reduce financial risks.

Time and cost overruns in the construction industry are a critical phenomenon that occurs in many construction industries across the globe (Apolot, Alinaitwe & Tindiwensi, 2011). Many projects experience cost and time overrun problems (Shi, Cheung & Arditi, 2001; Gamil & Abdul Rahman, 2018). These overruns are clustered among the most common and challenging issues faced by construction projects worldwide, which then consequently cause tremendous negative impacts upon project success and conflicts among project parties (Frimpong, Oluwoye & Crawford, 2003; Alaghbari *et al.*, 2007; Abd El-Razek *et al.*, 2008). Many researchers have explored several factors causing time and cost overruns; one of these factors is poor communication among construction parties. However, no study has discussed how poor communication causes cost and time overruns; therefore, this study aimed to present the effect of poor communication on the occurrence of time and cost overruns in the construction industry (CI).

STUDY METHODOLOGY

This study adopted two different methods: a literature survey and a qualitative approach in the form of verbal interviews. A literature survey was adopted by analysing outcomes from archival literature and extracting the ranks of poor communication among other inclining factors of the construction industry.

A qualitative study was conducted using interviews with construction experts. Questions were designed according to the findings from the literature. A number of six experts from the construction industry were asked to share their views and opinions on the severity of poor communication in the construction industry and its relative consequences. The interviews were audio-recorded and then manually transcribed into text form. The expert selection in this study was defined according to Fei & Khan (2015), which listed the attributes and quality measures of experts as being those aged more than 30 years, who have worked for more than ten years in the construction industry and who have taken a high level of management and leadership in corporate roles. The same method also was implied by Gamil *et al.* (2017) to investigate the failure factors of Yemen construction projects. Figure 1 illustrates the process used to carry out this research.

The analysis method of collecting data from interviews is a qualitative content analysis, which is carried out by dividing the transcript into different themes to achieve the objectives outlined initially before conducting the study.

LITERATURE INVESTIGATION INTO THE CAUSATIVE FACTORS OF COST AND TIME OVERRUNS

This part introduces an intensive investigation of published academic articles that focused on the causes of cost and time overruns, where poor communication was a common factor outlined in all of the articles. From the results, each factor causing cost and time overruns was ranked based on its severity using statistical analysis. The severity of poor communication was then determined to investigate further its role in triggering cost and time overruns. The following subsections explain the process and analysis.

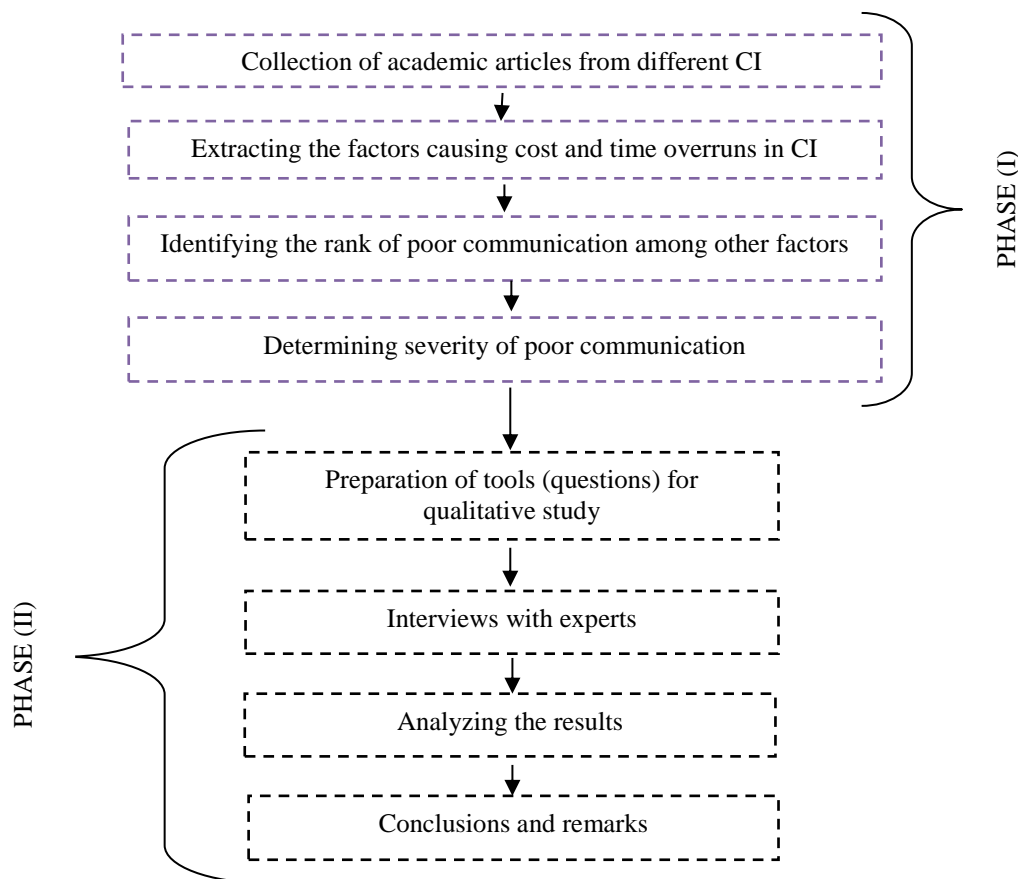


Figure 1: Flowchart of the study investigation

Effects of Poor Communication on Time Overrun

Time overrun is also known as a delay, which refers to the extra time required to complete a project beyond the stipulated time estimated in the planning stage (Chan & Kumaraswamy 1997; Dainty *et al.*, 2006; Alaghbari, 2007). It is classified as the most recurring problem in construction projects and in return, causes adverse effects on project success (Faridi & ElSayegh, 2006). It has been suggested that without proper communication of the objective among stakeholders, delays can be caused due to misinterpretation and wrong execution of project activities (Olawale & Sun, 2010). Literature has revealed that poor communication is one of the main factors contributing to delays in construction (Abdul-Rahman *et al.*, 2006; Ren, Atout & Jones 2008; Afshari *et al.*, 2010). Delays caused by poor communication can be in the form of slow information flow, improper communication channels, wrong design, wrong

interpretation, rework and more (Love & Li, 2000; Dainty *et al.*, 2006; Sambasivan & Yau, 2007; Sunday & Afolarin, 2013; Tipili *et al.*, 2014).

Additional forms of poor communication are described in the following items:

- Late and slow dissemination of information: delays in delivering information cause wrong execution of project activities and requires rehabilitation; this causes delays in project progress due to the additional time necessary for restoration and correction (Rose, 2013).
- Lack of communication during the early stages of a contract, causing continuous changes to the contract and delays in progress (Shehu *et al.*, 2014).
- Inadequate communications among the construction team cause poor management of project information, which consequently causes delays in the work process (Shehu *et al.*, 2014).
- Ineffective or unprepared reporting systems can cause poor communication (Tipili *et al.*, 2014).
- Improper channels of communication, especially during emergencies or during reporting of any work process, can cause delays in work progress (Tipili *et al.*, 2014).
- Malfunction of communication technologies, which can cause delays in transferring the information (Dainty *et al.* 2006).
- Faulty transmission of a message via an inappropriate medium or channel. This happens when the receiver engages with too much information from different channels and mediums, therefore resulting in poor communication (Dainty *et al.* 2006).

Many researchers around the world have investigated the factors causing time overrun in their respective construction industries, and one of the factors is poor communication. Based on these studies, severity percentages of poor communication creating time overrun are calculated and presented in Table 1. Severity percentage (SP) was calculated by the process of normalisation using the following formula:

$$\text{Severity percentage (SP)} = \left[\frac{(\text{no. of overrun factors} - \text{rank of poor communication})}{\text{no. of overrun factors}} \right] \times 100$$

Table 1 illustrates the severity of poor communication amongst the identified time overrun factors by different researchers in three different regions. In the Middle East region, the most severe country is Libya, and the least severe is Afghanistan, with 95.35% and 10%, respectively. In the African area, the most critical is Nigeria and the least in Ghana, with 93.02% and 46.88%, respectively. For the Asian region, the most severed country is Thailand and the least in Hong Kong, with 86.67% and 33.33%, respectively. The overall average for the three regions indicates that there is a considerable gap in the severity percentages of poor communication in their respective construction industries. The standard deviation shows high variation between the means, illustrating that severity deviated noticeably in different countries, which may be due to less support of communication technology or diversity of construction stakeholders in terms of language and cultural backgrounds. Countries that have diverse construction industries and low implementation of communication systems have high severities. Also, countries that are implying structured and proper systems in the construction industry are less severe in terms of poor communication. However, poor communication among construction teams remains a challenge, where not enough attention is given to

improving communication and information management, which can be an effective method for enhancing coordination of activities in the construction industry.

Table 1: Severity of Poor Communication to Time Overrun

Region	Country	Author (s)	No. of time overrun factors	Ranks of poor communication	Severity Percentage (%)
Middle east	Afghanistan	Gidado & Ghulam (2012)	10	9	10.00
	Iraq	Qais Kadhim (2013)	58	19	67.24
	Kuwait	Koushki & Kartam, (2005)	8	7	12.50
	Jordan	Odeh & Battaineh (2002)	28	20	28.57
	Egypt	Abd El-Razek <i>et al.</i> (2008)	7	3	57.14
	Saudi Arabia	Assaf <i>et al.</i> (1995)	56	10	82.14
	Lebanon	Mezher and Tawil (1998)	64	11	82.81
	UAE	Faridi & El-Sayegh, (2006)	44	7	84.09
	Iran	Pourrostam & Ismail (2012)	26	10	61.54
	Libya	Tumi, Omran & Pakir (2009)	43	2	95.35
African	Ghana	Fugar & Agyakwah-Baah, (2010)	32	17	46.88
	Uganda	Apolot <i>et al.</i> (2011)	22	8	63.64
	Tanzania	Kikwasi (2013)	21	3	85.71
	Nigeria	Mohammed & Isah (2012)	43	3	93.02
Asian	India	Salunkhe & Patil (2014)	8	5	37.50
	Hong Kong	Lo <i>et al.</i> (2006)	30	20	33.33
	Thailand	Toor & Ogunlana (2008)	75	10	86.67
	Malaysia	Sambasivan & Yau (2006)	28	9	67.86
				Minimum percentage	10.00
				Maximum percentage	95.35
				Mean	60.89
				Standard deviation	27.18

Effect of Poor Communication to Cost Overrun

The concept of cost overrun in the construction industry occurs when a project fails financially to achieve the stipulated budget estimations (Razaki *et al.*, 2009; Abdul Rahman *et al.*, 2013). It also happens when a project's cost exceeds the contract sum, causing major conflict and litigation that may lead to project suspension or failure (Shehu *et al.*, 2014). A study by Alhomidan (2010) in Saudi Arabia identified 41 cost overrun factors in several road construction projects. It was found that most of the critical factors affecting cost overruns were internal administrative difficulties, poor communication among construction parties, payment deferment and delays in decision making. Bassioni, Sarhan, and Zaki (2013) found that a lack of communication and coordination between design participants of different backgrounds recorded higher relative impacts to cost overrun in the design phase of the Egyptian construction industry. As with time overrun factors, poor communication is regarded as an important factor leading to cost overrun. The collection of these studies is presented in Table 2.

Table 2 shows the severity of poor communication in causing cost overrun in construction projects. Studies in Saudi Arabia and Malaysia found that poor communication had higher severity percentages, with 92.68% and 74.29%, respectively, while for Uganda and Egypt, poor communication had lower severity percentages, with 54.55% and 68.75%, respectively. The

mean value of the percentages is notable and the standard deviation is considered relatively small, which indicates that the construction industries in these countries have similar patterns in terms of cost effects. These findings may be related to the employment of foreign construction workers in Saudi Arabia and Malaysia, where foreign workers statistics in Saudi Arabia were more than 11 million by the year of 2017 (Arabnews, 2017) and more than 1.7 million in Malaysia in the same year (NST, 2017), while they are unable to communicate effectively while in Uganda and Egypt used local workers.

Table 2: Severity of poor communication to cost overrun

Country	Author(s)	Number of factors	The rank of poor communication	Percentage of severity (%)
Uganda	Apolot <i>et al.</i> (2011)	22	10	54.55
Egypt	Bassioni <i>et al.</i> (2013)	16	5	68.75
Malaysia	Abdul Rahman <i>et al.</i> (2013)	35	9	74.29
Saudi Arabia	Alhomidan (2010)	41	3	92.68
			Minimum percentage	54.55
			Maximum percentage	92.68
			Mean	74.24
			Standard deviation	14.17

Mitigation Measures to Poor Communication

Several mitigation measures have been proposed by researchers to minimise the effect of poor communication that leads to cost and time overrun in the construction industry. Among them, Dainty *et al.* (2006) recommended three mitigation measures, including adopting the use of information communication technologies (ICT) to manage communication flow in the construction industry, developing an effective system of communication among construction teams to accelerate communication and decision making (which saves time in the project communication process) and finally promoting structured and appropriate organisational systems to improve the communication process and contribute to clearly-assigned responsibilities and tasks to the designated party. Tai, Wang & Anumba (2009) then proposed three measures: developing a communication platform for all project stakeholders, improving the organisational structure of the construction team and finally adopting uniform standards to manage information and adopting the use of advanced communication technologies.

The Results of Qualitative Study

This part introduces the results of the exploratory interviews with six construction experts. The first part of the question is on the demographic profile of the experts. Experts were asked to share their highest qualification, years of experience in the industry, and their current designation in their corporation.

Table 3 presents the demographic profile of participants in this study. It was found that all of the participants had worked in the industry for more than ten years, attained degrees and participated in a managerial role in their respective companies. These attributes make them eligible to take part in this study.

Table 3: Participants' demographic profile

Participants	Qualification	Years of experience	Role in the company
1	Bachelor degree	23	Managerial
2	Master degree	18	Operational
3	PhD	14	Managerial
4	Master degree	16	Managerial
5	Master degree	25	Managerial
6	Master degree	13	Technical

Significant Results Extracted from Interview Transcriptions

During interviews with six construction experts, participants shared their thoughts and views on the severity of poor communication causing cost and time overruns. The interviews were audio-recorded then transcribed to extract important data. A thematic content analysis method was used to establish different themes of the results to distinguish and discuss each of them individually. The investigative study uncovered important information that demonstrated the significance of the previous finding from the literature survey and was then summarised into four key themes of discussion in the subsections.

The Severity of Poor Communication in the Construction Industry

The experts were asked to share their opinions on how severe poor communication in the construction industry. Experts responded with different views. According to Expert 1, poor communication is very severe and not enough concern is given to overcoming this problem, stating that the construction industry is complex and fragmented and thus requires more attention to establish an effective communication process. Expert 1 added that poor communication could cause conflict and project failure if not produced from the early stage. Expert 2 described poor communication as a significant issue faced by the construction industry and added that it requires more attention from researchers and construction practitioners to deal with the high volume of information and provide proper planning for its dissemination and management.

Furthermore, Expert 3 suggested that to supply projects of good quality, effective communication has to be applied from the initiation of the project to the completion stage. Therefore, improper communication leads to poor construction quality and a lack of collaboration among construction parties. Expert 4 declared that poor communication in the construction industry, in particular, is a severe failure factor of poor collaboration and cooperation among project players. Expert 5 stated that communication is an essential component in a project and needs to be performed efficiently to avoid miscommunication and disputes among project parties. Finally, Expert 6 added that poor communication in the construction industry is a common issue and that most projects are associated with a lack of communication. This consequently causes many other issues, such as disputes and lack of mutual trust and transparency.

The Severity of Poor Communication to Time Overruns

Experts were then asked to describe and share insights into the severity of poor communication in causing time overrun. Expert 1 outlined that poor communication causes considerable time overruns because the late dissemination of information causes delays in executing any task and

therefore is severe in terms of time overruns. Expert 2 added that poor communication is critical because it triggers delays in every stage of a construction project and that there is a dire need to process and deliver information on time, as effective communication leads to effective time planning. He added that the forms of delay come about due to misunderstandings and wrong execution of project activity, which requires time to restore erroneous activities. Expert 3 stressed that communication is a crucial component to the success of the construction industry and that if it is executed improperly, it will cause delays and many negative consequences. Delays can be caused by improper communication in many direct and indirect forms, such as conflicts, wrong execution, rework, and others. Expert four outlined that time overrun is caused by the slow flow of project information caused due to the improper selection of communication media and channels. Expert five further described that time overrun is caused by inappropriate communication, where the wrong delivery of a message is associated with extra time. Expert 6 added that poor communication is severe as it causes time overrun and thus requires more attention by top management of the project to reconsider the issue and that poor communication can cause delays if communication is not structured efficiently, whereby everyone in the project is entitled to understand from whence to receive and send the information in a timely and effective process.

The Severity of Poor Communication to Cost Overruns

Construction experts in this study were also asked to share their opinions on the severity of poor communication in causing cost overruns triggered by improper communication. According to the Expert 1, there is a correlation between cost and time overruns in regards to poor communication: poor communication causes time overrun, which will subsequently cause cost overrun due to the late delivery of the project and any rework due to the wrong execution of activities. He added that costs are incurred in correcting any erroneous executions of activities due to miscommunication. For example, during the construction of a particular building component, if the wrong technical information is delivered to the workforce, the work will be executed wrongly and then required to be demolished and correction measures applied; these processes are associated with extra costs and waste generation. Expert 2 shared that view and outlined that cost overrun is caused by inaccurate execution of activities in the project. This issue is caused by improper communication among practitioners of the project. Expert 3 added that the severity of poor communication in causing cost overrun is significant from many aspects, the foremost (in his opinion) being that improper communication causes disputes among construction teams and that this dispute is associated with cost in regards to misunderstanding both technical and nontechnical aspects. Expert 4 also described that poor communication among project parties is very critical in causing cost overrun because most issues that arise in the project lifecycle are caused by poor communication from the first standpoint and this is associated with cost alongside project time. According to Expert 5, poor communication is critical in causing cost overrun because the extra budget will be required due to the restoration of wrong work executed due to the false transformation of technical information and the improper selection of communication media and channels. Expert 6 also agreed with Expert 5, mentioning that poor communication and late delivery of project information cause cost overruns. Everyone in the project team needs to be alert to any changes and progress, which requires proper communication. As an overall recap of the discussion, the severity of poor communication in causing cost overrun is due to the extra cost of restoration and rework of wrong activities.

Comments on Literature Results

The final question asked of participants was to comment on the data shown in Tables 1 and 2 and to share their insights and views. The first expert commented that the data explained numerical analysis of the degree of severity of poor communication in the construction industry and those data show variations in the industry from one country to another, which might be due to differences in the advanced level of the industry and the technological elements used in communication. The expert added that those countries with diversified sectors have a higher severity of poor communication because the practitioners have different backgrounds, cultures and languages, which might cause communication problems during the execution of project activities. However, Expert 2 commented that the results introduced a new method of extracting secondary data to be analysed empirically to explain the phenomenon of poor communication in the construction industry and its severity to cost and time overruns. Expert three then further added that the method is acceptable and the findings explained the severity of poor communication and provided understandable figures to observe the state of communication across different industries. Further, Expert 4 added that the variation of results explains that the difference in development and prosperity of the construction industry is associated with proper communication means and methods; thus, advanced countries experience less severity. Expert 5 shared the same opinion and stated that the results showed a numerical estimation of the severity of poor communication in causing cost and time overruns and that is a useful approach to utilise secondary data. Finally, Expert 6 appreciated the outcomes and described it as precise figures to assess the severity of poor communication causing cost and time overruns.

Discussion of the Findings

The results have discussed in detail how improper communication can lead to cost and time overruns and the severity of poor communication, among other factors. According to the analysis of archival literature, the outcomes introduce a new technique for looking at the issue and its severity rank in comparison with other factors. Poor communication is a major issue leading to cost and time overruns in the construction industry. The exploratory study also outlines the ongoing practices at the corporate level. From the results, poor communication is critical in causing cost and time overruns. These findings are correspondent with the conclusions produced by PMI (2013), which state that more than half of all project budget risk is due to ineffective communications and that poor communication is considered the leading cause of time overruns.

CONCLUSION

It is common for the construction industry to have inconsistencies and communication challenges due to its characteristics as a complex and fragmented economic sector. This study aimed to investigate poor communication and identify its effect on the cost and time objectives of construction projects. Furthermore, this study assessed the importance of communication among project stakeholders as the cause of time and cost overruns respective to other factors. Archival literature was used as secondary data to extract the rank of inadequate communication to the causation of cost and time overruns. The findings indicated a diverse range of the level of importance given to communication in different countries. An exploratory study was carried out with six experts to gain insights into the issue of poor communication and to check the validity of the findings produced from archival investigations. Initially, many factors have been identified by researchers as causes of cost and time overruns. Poor communication is

considered one of the leading factors and this paper has summarised the severity of poor communication toward overruns based on published research studies around the globe. It was found that the effects of poor communication differ among the countries reviewed, but was nonetheless significant contributor to overruns. Therefore maintaining projects within planned schedules and stipulated costs require efficient and effective communication among construction practitioners.

The outcome of this study serves best to understand and appreciate the negative impact of poor communication on cost and time objectives in construction projects. The study recommends construction players to take mitigation measures by introducing an awareness campaign among their employers to give attention to the understanding of the communication process throughout the lifecycle of projects. This study was limited to cost and time overrun and the role of poor communication hence, more investigations are required to investigate the issue of communication in different stages of the project, and further study is needed to quantitatively study the severity of cost and time overruns with larger sample size, so that more extensive conclusions can be drawn from such empirical studies.

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