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IMPROVEMENTS OF THE COMMUNICATION BETWEEN CONSULTANTS AND CONTRACTORS DURING THE CONSTRUCTION PHASE IN MALAYSIA

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Abstract

Effective communication is becoming increasingly important in project construction because of the growing demands of the projects. Fundamental to the successful delivery of projects in the construction industry is high-quality communications. The objectives of this paper were to investigate communication methods commonly used in construction projects, to identify factors contributing to communication breakdown, and to suggest actions to minimise communication breakdown during the construction phase between consultants and contractors. Through a comprehensive literature review the communication channels, modes and mediums were recognised. The contributing factors were categorised into project characteristics, personal attitude, communication method, communication management, communication barrier and external aspect. While, the actions to minimise communication breakdown were extracted from previous studies and classified into communication development, communication management and communication method. A quantitative method (questionnaire survey) with a close-ended questionnaire with experienced industry practitioners from a large population of 135 respondents comprising consultants, contractors and developers was used for the data collection. It produced results that generalise, compare and summarise all collected data. The study identified personal attitude as the highest contributor to communication breakdown and communication management was the most effective element to minimise the communication breakdown. It would take a combined effort on the part of all construction parties from consultants, contractors and subcontractors to the project owner to minimise communication breakdown. The findings might help to achieve project success through the improvement of communication between consultants and contractors during the construction phase.

Keyword: Communication breakdown, contributing factors, project success, construction, contractor and sub contractor.

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INTRODUCTION

Communication is seen as an important component in the project management process. The set of standard terminology and guidelines created by the Project Management Institute (PMI) for project management is known as the project management knowledge area. The standard is evolving and periodically updated in its Project Management Body of Knowledge (PMBoK). There were ten areas of project management knowledge, which coincide within the project management process group. One of the knowledge areas was communications management.

Despite the emphasis on the importance of communication in project management, the problem in the construction industry often referred to as communication problems. The communication problem was increasingly recognised as a serious and concern issue to the construction players. Olanrewaju et al. (2017) stated in their study that the construction sector in Malaysia was experiencing high cases of delays, cost and time overruns, poor quality, health and safety issues, pollution and sustainability issues as a result of ineffective communication practices. Olanrewaju et al. (2017) and Soetanto et al. (2015) claimed that poor communication was the root of poor performance in the design and construction of the Malaysian construction sector. Yap et al. (2018) added that the issue of lack of communication among the contracting parties had plagued the construction industry particularly concerning delay management and cost control, and constitute the major factors of time-cost overruns in Malaysia. Communication processes were an essential element in delivering information flow forwards, sideways, backward within an organisation to another organisation (Ahmad Pozin et al., 2018). As reported by (Ahmad Pozin et al., 2018), in recent years, effective communication was becoming increasingly important in project construction because of the growing demands of the projects, along with the heavy amounts of technical work and the complexity of the supply chain process. Alzeraa et al. (2018) mentioned that project success might be significantly influenced by project communications, besides human elements and interpersonal relations. While, a study made by Lee et al. (2018) reported that when a question about the main driver for delivering a successful construction project was asked to project managers through a survey, communication was the most common answer received. Without doubt, Esther Paik et al. (2017) and Tran et al. (2017) stated that communication was among the factor which was vital for project success. Reza Hosseini et al. (2017) highlights that the fundamental to the successful delivery of projects in the construction industry was high-quality communications. Therefore, construction project success relies much on the communication aspect. However, the problem that frequently occur in construction projects was ineffective communication (Djajalaksana et al., 2017; Ejohwomu et al., 2017; Gamil and Abdul Rahman, 2020; Nursin et al.,2018; Yap

and Skitmore, 2018), lack of communication (Butt et al., 2016; Olanrewaju et al., 2017; Pozin et al., 2016), lack of effective communication (Alves and Shah, 2018) poor management of communication (Gamil et al., 2020), poor communication (Soetanto et al., 2015; Tafazzoli et al., 2017), bad communication (Oladokun et al., 2018) and improper communication (Gamil et al., 2020).

According to Badi et al. (2017), construction projects require multidisciplinary communication and collaboration as it was related to excessive complexity and involve massive amounts of building data. Data obtained from previous studies show that several types, networks, mediums, ways and channels available to be used by construction players to transmit communication within themselves. However, much uncertainty still exists about the appropriate and preferred method of communication to connect consultants and contractors effectively and efficiently, during the construction phase. Recent researches mostly explore the use of WhatsApp (Ahmad Pozin et al., 2018), virtual design and construction (Hassan et al., 2018), cloud computing (Mohd Fateh et al., 2016; Othman et al., 2018) and virtual environment (Pozin et al., 2017), as communication applications among the construction players to investigate on its effectiveness in improving communication.

This study, however, will not approach in detail Information and Communication Technology (ICT). Instead, it focussed to suggest the other sides of best practices for corrective action to achieve the most effective and efficient communication into the minimisation of communication breakdown. Regarding these matters, the sources and causes of communication breakdown shall be identified to find the ways to minimise communication problems from occurring in construction projects henceforth improve communication between contracting parties to the construction industry.

LITERATURE REVIEW

Communication in Construction Industry

Taleb et al. (2017) and Alqaisi, (2018) explain that communication was the lifeblood of any system of every human interaction. Studies also stated that, without communication, knowledge exchange would never occur (Ahmad Pozin & Mohd Nawi, 2018) and no meaningful or coherent activity can take place (Alqaisi, 2018). The communication environment of the project teams or members mainly involves various players from the developers, landowners, consultants, local authorities, service providers, relevant government departments, contractors, subcontractors, suppliers and manufacturers. Therefore, as mentioned by Alzeraa et al. (2018), communication takes place not only between individuals who were involved in a construction project but it was involving many organisations. Therefore, communication indeed was very significant to the construction industry. The main functions of communication,

as informed by Kwofie et al. (2017) includes controlling, to give motivation, showing emotional expression and information transmission. Communication as introduced by the Project Management Institute (PMI) is the movement of information from one point in an organisation to another. In projects, this must happen well between the construction players. Communication in construction project teams, as presented by Reza Hosseini et al. (2017), requires an element of persuasion and conviction where sender of information should become able to convince the receiver about some aspect of design and engineering calculations. Other than that, Tran et al. (2017) declared that communication in construction management was a means of interacting with personnel involved in a project. Communication was a very important factor in the construction field and this was confirmed through interviews conducted by Oladokun and Alshaikh (2018), and supported by Olanrewaju et al (2017) in their study. The study said that at every stage of the construction lifecycle, information needs to be stored, retrieved, and communicated. In the meantime, C. Wu et al. (2017) raised the importance of communication due to its centralised nature whereby each construction project team had different responsibilities and different times to join the project. As for the matter, C. Wu et al. (2017) saw construction projects were typically characterised by high uncertainty, complexity and inter-organisational task interdependence, which makes communication even more important.

The Construction Phase

A 'construction project' was clarified by Badi and Diamantidou (2017) as a network of organisations bounded by flows of information exchange and communicational networks of relationships. Process of a construction project basically was divided into three main phases which were pre-construction, during construction and post-construction. As per traditional construction procurement, construction parties involved during the pre-construction phase were only consultants. Meanwhile, for phase during construction and post-construction, the project teams consist of both consultants and contractor who were taking responsibility of the construction project within a certain period of time, dependant on the respective condition of a contract. Meanwhile, the post-construction phase commences when the project was handed over to the client. Prior to the engagement of both consultants and contractors. The client may or may not stipulate on the communication medium to be practised along the contract period. Stage of during construction usually is addressed by most studies as the project implementation phase. G. Wu et al. (2017) stated that project teams were involved in resource exchange and information communication during project implementation. The study adds at the particular stage of construction work, a situation of the construction project team, both internal and external, was complex. Construction phase involving activities of implementation and

management of work on-site based on the approval obtained from respective authorities in the pre-construction phase.

Methods and Modes of Communication

Djajalaksana et al. (2017) explicated that those methods of communication fall under the vital element of project management. The communication methods were commonly applied in the construction industry, worldwide. This paper was focusing on the communication methods practised by consultants and contractors during the construction phase, excluding the computer software such as Building Information Modelling (BIM) of Information and Communication Technology (ICT) which were explored by most of the previous studies. Literatures stated that the main types of communication were verbal, non-verbal, written and visual. Al-Mayahi et al. (2018) settled those modes of the communication process include the appropriate selection of communication medium which varies depending on the type and phase of the project. The communication medium could be in the form of softcopy or hardcopy which dependant on the types of communication used to deliver the messages. Lee et al. (2018) marked off on the use of visual communication as a better mode of communication to be practised in the construction industry. The argument was visual communication was useful for better understanding of information in the construction project and used to aid effective communication between project participants.

Contribution Factors to Communication Breakdown

Collins English Dictionary marks out communication breakdown as a lack of communication or a failure to exchange information and Fitri Othman et al. (2017) described communication breakdown as a breakup of information flow and failure of coordination process in project management. Ineffective communication amongst construction project stakeholders, as identified by Ejohwomu et al. (2017) through empirical evidence, exists as a significant factor accountable for the poor performance of construction projects. A study by Djajalaksana et al. (2017) also raised the recurring issue of ineffective communication which had been published as a top reason causal to failure of a construction project, though the importance of communication had been made known. Apart from ineffective communication, another communication issue as recorded by Wen Lim et al. (2018) was decreasing willingness to communicate. The study elaborates that project teams were refusing to share their information without interpersonal trust. Hassan et al. (2018) emphasised that the construction industry was highly fragmented and multidisciplinary whereby the client's stress their expectation and requirement to be fulfilled. Therefore, effective communication among disciplines was crucial for a construction project to be

successfully executed, as the fragmented nature of the industry would bring difficulties to all professions involved to meet the client's expectations.

Minimisation of Communication Breakdown

From the findings of the literature review, the impact of communication breakdown resulted in a negative impact rather than a positive impact. Communication breakdown affects the overall performance of the construction project as well as construction players who were appointed to carry out the work, within the stipulated time, cost, quality, safety and health. There upon, the right practice of effective and efficient communication was needed to minimise the issue of communication breakdown from affecting the construction projects and resulting in loss to the client. Oladokun et al. (2018) perceived improving communication as an essential solution to the communication breakdown. While empirical evidence through the study by Ejohwomu et al. (2017) showed the importance of skills in improving the effectiveness of communication.

The construction phase required many considerations to be taken into account like who needs information, authorised people to access information, the time they would be calling for information, where and in what format to store the information, and how to retrieve them, as introduced by Taleb et al. (2017). First and foremost, Taleb et al. (2017) suggested critical skills on a clear understanding of how communication takes place and how to apply it effectively and efficiently, should be acquired to minimise communication breakdown. Later on, Djajalaksana et al. (2017) revealed the chain of communication needs to be passed on from the designer either the architect and engineers to the one who actually 'builds' the design, which was the contractor. All those parties shall be involved in the coordination and sequence of the work, throughout the construction period. Other than that, Kwofie et al. (2017) underlined that influencing and achieving effective communication require construction players to absorb the knowledge and understand the nature and features of construction project typologies as well as its intrinsic communication ineffectiveness from its unique attributes. The effectiveness of communication during the construction phase initially contributed by the preparation made during the pre-construction stage. Project initiation by the client itself must be comprehensively done to help smooth communication and interaction during the construction phase. A study by Kwofie et al. (2017) testimonies that construction players who communicate by acclimatising to the project's characteristics and the project's context were more likely to be successful and promote team effectiveness.

RESEARCH METHODOLOGY

The data collection of this study involved the collection of both secondary data which was the literature review and primary data through a questionnaire survey.

A further step was processing data analysis to the content and descriptive analysis upon gathering all the data collected. The questionnaire survey was selected to collect quantitative data in a regular course to obtain compatible and orderly data. It was used to keep the facts of the respondents in the demographic background as well as occupational information of the respondents before further deep into the respondent's common practice and experiences. Through the small scale of a pilot test, several questions in the preliminary questionnaire set had been eliminated, revised and reworded for a better understanding of the prospective respondents. The pilot test helped to collect reliable feedback, validate the content of the instrument, determine the effectiveness of the survey design, check the people understanding together with the ability to answer the questionnaire. All feedbacks were incorporated into the final set of the questionnaire before distributing the questionnaire. The questionnaire was developed to cover all the data related to the research objectives. The survey questionnaire which consisted of a series of questions was divided into four sections including demographic background and organisation information of the respondents:

- **Section A:** pursued the interest and desire of respondents in their cooperation to influence the attitude of the respondents to be part of the questionnaire. Subsequent sections represent each research objective in the sequence of the study. Each of the sections was subdivided and arranged into several related categories of 3 to a maximum of 6 categories.
- **Section B:** intended to reflect consultants' and contractors' attitudes and routine in using various modes and mediums of communication to transmit their messages to each other.
- **Section C**: determined to establish a level of agreement among the consultants and contractors based on the list of factors that contribute to communication breakdown.
- **Section D**: The last section of the questionnaire contemplated ranking the level of effectiveness for each initiative to minimise communication breakdown retrieved from previous studies.

For Section A, the selection of answers was varying. There were questions where only one answer was allowable and some questions open for multiple picks. However, for Section B to Section D, 5-point of three different Likert scales were incorporated to suit the research questions and at the same time, enable responses to be given on a continuum. The questionnaire was composed of straightforward questions through the use of simple and specific English language.

The respondents of the study were consultants and contractors related to the construction industry who involved in during the construction phase and dealing with either consultant and / or contractors. The contractors include main contractors and nominated contractors with Grade 7 (G7) qualification certified by the Construction Industry Development Board (CIDB). Primary data of the study were collected from samples with various ranges of age, profession and year of experience in the construction industry. Eligibility criteria required individuals to have graduated with at least a Diploma, not less than 21 years old and have working experience. The estimated population parameter of consultants who have registered with respective professional bodies and Grade 7 contractors who have registered with the Construction Industry Development Board (CIDB), within Malaysia was not more than thirty thousand (30,000). Therefore, stratified sampling was used. The respondents were divided into two groups, contractor and consultant. Both groups will represent the population of the study. From the formula by Krejcie et al. (1970), for a thirty thousand (30,000) population, the sample size is 379 respondents.

The questionnaire was documented in two versions which were Google form and the paper-pencil version. The confidentiality of quantitative respondents was maintained for the study. The invitations were made by sharing the link of the web survey of Google form with a short introduction to several contacts through social media of WhatsApp application and electronic mail. Due to some requests from the prospective respondent and to easily approach prospective respondent, the questionnaire also had been distributed in a hardcopy of the paper-pencil questionnaire. The data collection began upon completion of a pilot test by inviting prospective respondents to participate in the questionnaires over many possible ways to achieve the sample size of respondents as established by Krejcie et al. (1970). At the end of the data collection, the study managed to collect 135 out of 386 number of questionnaires distributed. It translates to thirty-five (35%) of the response rate. The rate was acceptable for a self-administrated survey (Mohd Fateh et al., 2019).

The questionnaire survey was analysed on the frequency, percentage, mean and ranking to the spread of scores and general tendencies in the data. Mean then was produced to spot the ranking amongst variables of the same category and also ranking amongst categories of variables for Section B to D. The summary of the statistics was tabulated and graphed for better understanding and a clearer picture of the analysis. The paper-pencil based questionnaires were documented into the Google form format and export to Microsoft Excel. All the collected data of the quantitative method then were imported from Microsoft Excel into the Statistical Package for the School Sciences (SPSS).

ANALYSIS AND DISCUSSION

Demographic Background

Data on the demographic background were gained to gather personal information of the samples. In connection with Table 1, only respondents aged over 21 years old were included in the study. The highest respondents answering the questionnaire aged ranging from 27 to 36 years old at 43% for both consultants and contractors. At the same time, 3% of the respondents aged above 56 years old which marked off as the lowest number of respondents. In terms of years of experience in the construction industry, most of the respondents were involved in the construction industry for more than 2 years and the least were 8.1% of fresh graduates. Indefinitely, it was a remarkable sample ensemble to answer the questionnaire from a different demographic background on the age and experience of working in the construction industry with the majority held by the experienced respondents.

Table 1: Demographics of Respondents

Organisation	Age	Experience in Construction Industry (Years)					Frequency (Age)
		0 - 1	2 - 5	6 - 10	11 - 20	> 20	
Consultant	21 - 26	6	6	0	0	0	**12**
	27 - 36	0	11	17	5	0	**33**
	37 - 46	0	0	4	11	3	**18**
	47 - 56	0	0	0	0	15	**15**
	> 56	0	0	0	0	3	**3**
Contractor	21 - 26	2	11	1	0	0	**14**
	27 - 36	3	9	13	0	0	**25**
	37 - 46	0	0	1	8	1	**10**
	47 - 56	0	0	0	2	2	**4**
	> 56	0	0	0	0	1	**1**
Frequency (Experience)		**11**	**37**	**36**	**26**	**25**	**135**

Level of Education, Organisation, Profession and Current Position

The profession of the respondents discrete to nine different backgrounds as shown in Table 2. Amongst the higher number of respondents work as an Engineer, Architect and Quantity Surveyor which these three professions were the main stakeholders in managing construction projects both as consultants as well as contractors. at 89.6% of the sample. The respective Engineers, Architects and Quantity Surveyors mostly held academic qualifications with Bachelor Degree which was the minimum requirement to sit for a professional assessment. Fifteen Engineers, Architects and Quantity Surveyors who work with consultants

were qualified professionals in their profession of which three numbers of the contractors from the same group of the profession also have a professional qualification. It can be measured at a percentage of 20.3% and 6.4% of the overall population of each type of organisation. Including professionals as respondents adding extra reliability and validity to the data. A percentage of more than 20% of the whole contractors' sample population were positioned not lower than middle management level in their organisation. While almost 40% of consultants were managers, managing directors, directors and principals of the organisation they were working with. Response from the top and middle management levels were important as they made the most decisions in the management of construction projects within an organisation not to mention they had more experience and knowledge on the matter of the study.

Table 2: Background and Occupational Information of Respondents

Organisation	Level of Education	Profession									
		Architect	**Claim Manager**	**Engineer**	**Interior Designer**	**Land Surveyor**	**Landscape Architect**	**Planner**	**Project Manager**	**Quantity Surveyor**	**Frequency (Education)**
Consultant	Diploma	2	0	0	0	0	0	0	0	4	**6**
	Bachelor Degree	22	0	13	0	1	2	1	0	10	**49**
	Bachelor Degree and Professional (Ar/ Ir/ Sr/ Ts etc)	8	0	5	0	0	0	0	0	0	**13**
	Master Degree	4	0	3	1	0	1	0	0	1	**10**
	Master Degree and Professional (Ar/ Ir/ Sr/ Ts etc)	0	0	0	0	0	0	0	0	2	**2**
	PhD and Professional (Ar/ Ir/ Sr/ Ts etc)	0	1	0	0	0	0	0	0	0	**1**
	Frequency (Profession)	**36**	**1**	**21**	**1**	**1**	**3**	**1**	**0**	**17**	**81**
Contractor	Diploma	2	0	4	0	0	0	0	1	1	**8**
	Bachelor Degree	2	0	16	0	0	0	2	2	11	**33**
	Bachelor Degree and Professional (Ar/ Ir/ Sr/ Ts etc)	0	0	1	0	0	0	0	0	1	**2**
	Master Degree	0	0	4	0	0	0	2	0	4	**10**
	PhD, Professional (Ar/ Ir/ Sr/ Ts etc)	0	0	1	0	0	0	0	0	0	**1**
	Frequency (Profession)	**4**	**0**	**26**	**0**	**0**	**0**	**4**	**3**	**17**	**54**

In total, just below half the sample (40%) were contractors, of whom 60% were consultants. It was acceptable because a construction project commonly awards to only one main contractor with or without a nominated

subcontractor. Before the award, at least two consultants were appointed for one particular construction project to design, get approval for the design, consult and coordinate the work. Aside from it, respondents may have been working with both types of organisations during their period of practice.

The Communication Methods Commonly Used in Construction Projects during Construction Phase between Consultants and Contractors

This section sought for the frequency of communication modes and mediums commonly practised by consultants and contractors exceptionally during the construction phase. The result had revealed insight into the everyday routines of each respondent in managing construction projects. The mediums were divided by mode (verbal, written, and visual) in this questionnaire.

Table 3: Communication Mode and Medium – Verbal

Mode	Code	Communication Medium	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Verbal	B1A	Formal meeting	4.06	1	3.52	5
	B1C	Formal discussion	3.96	2		7
	B1D	Telephone-conversation	3.96	2		7
	B1F	Informal chat	3.70	3		13
	B1B	Presentation	3.31	4		18
	B1E	Video conference	2.10	5		24

Table 3 registered measurement made to the verbal communication mode and medium commonly used by consultants and contractors during the construction phase. It appeared that formal meeting evidence was the highest means for verbal communication by consultants and contractors during the construction phase. Meanwhile, the lowest mean was served by video-conference. A formal meeting in this framework was a pre-planned event that encompasses a technical meeting, site meeting, kick-off meeting and any form of a meeting held on during the construction phase. The event presented by many parties to the construction project including consultants and contractors which usually adhere at the interval of fortnightly to one (1) month. Communication during the construction phase was the most compelling when cost and time were crucial. That must be the reason why face-to-face meeting in the form of the formal meeting was commonly used during the construction phase for a clearer picture of the construction project's matter and faster decision-making. In addition, a formal meeting was a two-way form of communication.

Table 4: Communication Mode and Medium – Written

Mode	Code	Communication Medium	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Written	B2B	Electronic mail	4.24	1	3.74	1
	B2K	Social media (i.e. WhatsApp etc)	4.19	2		2
	B2F	Progress report	4.07	3		4
	B2J	Specification	3.98	4		6
	B2H	Minutes of meeting	3.96	5		7
	B2I	Bills of quantity	3.91	6		8
	B2M	Request For Information (RFI)	3.87	7		9
	B2L	Instruction (AI, EI)	3.84	8		10
	B2G	The standard form of contract	3.74	9		11
	B2D	Letter	3.72	10		12
	B2N	Method Statement	3.70	11		13
	B2O	Quotation	3.70	11		13
	B2A	Short Message Services (SMS)	2.98	12		16
	B2E	Memo	2.98	12		21
	B2C	Facsimile	2.67	13		22

As of written mode featured in Table 4, about 4.24 mean of respondent rate for electronic mail means it was the commonly used medium for communication during the construction phase. Social media like WhatsApp and progress reports follow behind. The so-called technology advancement of medium was probably selected because both electronic social media were fast and easy to use. Meantime, the progress report was a compulsory medium in every site meeting which usually held at the interval of fortnightly to one month. It was prepared progressively for every site meeting, becoming a reference to construction project teams to review the progress of physical work, the progress of project financial and problem arisen on site. That would be the reason why progress report had been used commonly by respondents.

Table 5: Communication Mode and Medium – Visual

Mode	Code	Communication Medium	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Visual	B3A	Drawing	4.12	1	3.42	3
	B3F	Pictures	3.87	2		9
	B3G	Catalogue	3.62	3		14
	B3B	Sketch	3.58	4		15
	B3E	Sample	3.44	5		17
	B3H	Physical mock-up	3.19	6		19
	B3C	3D perspective	3.04	7		20
	B3D	Physical model	2.50	8		23

From the delineation in Table 5 above, drawing was the most favourable for the visual mode of communication amongst respondents. In a construction project especially during the construction phase, drawing was supposed to be presented. Otherwise, construction work could not commence on-site and no coordination of work amongst consultants and contractors possible to happen. Pictures were selected as the second-highest visual mode of communication presumably to provide updates, show the progress of work on-site, highlight construction work that needs rectification and become a reference in the decision-making process. Correlated to the entire result for communication mode and medium, rating from the mean demonstrated that written mode of communication was at the top with electronic mail and social media as the commonly used medium for communication between consultants and contractors during the construction phase and the video-conference was rated at the bottom of communication medium. Nevertheless, the lowest mean of commonly used communication were the visual mode of communication. On the subject of communication modes and mediums commonly used during the construction phase between consultants and contractors, respondents for the questionnaire survey had chosen the easiest and fastest way to convey a message and/ or information even though the channel was informal. The highest mean of communication mode was written over verbal and visual with eight (8) over ten (10) of variables for communication medium were discriminating from the written mode of communication.

Factors Contributing to Communication Breakdown during Construction Phase between Consultants and Contractors

The result in Table 6 below indicated that 'project characteristic' position at an average in comparison to the other category of contributing factors to communication breakdown. Based on the answer received from most recipient for the category of project characteristic, the highest mean represented by 'changes in decision making'.

Table 6: Factors Contributing to Communication Breakdown – Project Characteristic

Category	Code	Factors Contributing to Communication Breakdown	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Project Characteristic	C1F	Changes in decision making	3.90	1		1
	C1F	Inappropriate planning of project communication	3.79	2		2
	C1E	Unclear or changes in project objectives	3.71	3		4
	C1G	Tensions of the job	3.41	4		17
	C1D	Unique attributes of project	3.39	5	3.50	18
	C1A	Project Brief	3.36	6		19
	C1B	Project duration or lifecycle	3.25	7		23
	C1C	Location of the project site	3.15	8		24

'Project characteristic' basically defined by the client to the project or project developer but the decision certainly gave effect to other construction parties containing consultants and contractors. In the context of this study, 'changes in decision making' occurred after the construction contract had been bound between construction parties. The reasons behind the changes were indefinite and some of it were unavoidable such as natural incidents or new requirement implemented by statutory bodies had to be complied. The client may change their decision due to the new evolution of construction methods or materials which could contribute to the reduction of construction cost. Higher selection of 'inappropriate planning of project communication' exhibited that proper planning was required for project communication. It should be designed to suit the 'project characteristic'. The inappropriateness had caused the delivery of the wrong type of information. Most respondents vote that 'location of project site' and 'project duration or lifecycle' do not cause a communication breakdown.

'Personal attitude' was among the reason why work on-site was not constructed according to the drawing or instruction. The highest rank of reasons as preferred by respondents advertised in Table 7 was 'lack of checking information' and 'poor leadership'. There were cases where contractors made own assumption on the construction method for some of the work without

checking on the information provided in the drawings or any kind of communication medium. Consequently, the work was erected according to the way they normally practice rather than referring to the details provided in the drawing.

Table 7: Factors Contributing to Communication Breakdown – Personal Attitude

Mode	Code	Factors Contributing to Communication Breakdown	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Personal Attitude	C2D	Lack of checking information	3.79	1		2
	C2G	Poor leadership	3.72	2		3
	C2A	Difference experience level	3.68	3		5
	C2C	Different interpretation or perception	3.67	4		6
	C2H	Afraid to ask for clarification	3.66	5	3.60	7
	C2E	Poor listener	3.57	6		12
	C2B	Lack of mutual respect	3.53	7		13
	C2F	Sense of self-importance	3.51	8		14
	C2I	Anger or temper issue	3.27	9		22

Leadership was the essence of project management so it was apparent that 'poor leadership' contributes to communication breakdown. Very few of respondents had chosen 'anger or temper issue' as the factors to communication breakdown as the construction industry was a professional field whereby construction parties were bound by the stipulated contract and agreement for the construction work. Therefore, there was a limitation on their action. The parties just cannot keep with the anger to warrant work keep going on and to keep a good relationship for the future construction job. 'Sense of self-importance' also related to professionalism and less elected by the respondents.

Under the 'communication method' and 'communication management' in connection with Table 8, 'poor documentation' and 'insufficient information' were the reason for communication breakdown. On the ground that construction project was highly fragmented, multidisciplinary and involve multiple organisations, it was a priority to communicate clearly, specifically, sufficiently and accurately. 'Poor documentation' can be interpreted as a situation that failed to send a message or information and 'insufficient information' was a condition of a message was sent incompletely which consequencetly failed to result in accurate action. The literature said this situation would mean the respective party had less intention to share their information.

Table 8: Factors Contributing to Communication Breakdown – Communication Method and Communication Management

Mode	Code	Factors Contributing to Communication Breakdown	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Communication Method	C3B	Poor documentation	3.60	1		10
	C3C	Inadequate writing skills	3.46	2		16
	C3A	Informal communication	3.36	3	3.32	19
	C3D	Inappropriate visualisation technique	3.33	4		20
	C3E	Misunderstanding of body language	2.87	5		28
Communication Management	C4B	Insufficient information	3.65	1		8
	C4D	Timing of information	3.64	2		9
	C4C	Unrealistic goals of promises	3.59	3	3.59	11
	C4A	Ineffective communication during the pre-construction phase	3.47	4		15

The construction industry was likely to use specialised content or technical terms that could be the reason for mean for the factor stated in Table 9 was higher as part of the 'communication barrier' category. Results from the questionnaire set out that 'adversarial or opposing cultures' at the lowest fourth. It seems that Malaysia itself drew on the varied cultures of the different people. The result of this study was in contrast to previous literature from countries other than Malaysia that had recorded 'communication barrier' was amongst the most significant category of communication breakdown to the respective countries.

Table 9: Factors Contributing to Communication Breakdown – Communication Barrier and External Aspect

Mode	Code	Factors Contributing to Communication Breakdown	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Communication Barrier	C5D	Technical language	3.32	1		21
	C5C	Ethical consideration	3.08	2		25
	C5B	Language challenges	3.07	3	3.11	26
	C5A	Adversarial cultures (opposing cultures)	2.96	4		27
External	C6C	Political interference	3.08	1		25

	C6B	Physical distance or interruption	2.84	2	2.90	29
	C6A	The noisy environment during communication	2.79	3		30

The highest rank of factors external aspect' was 'political interference' and it was an intractable issue. Construction projects principally related to government presumably siding this problem upon a presidential political election. In outward, 'noisy environment during communication' was least compelling on account of the environment during communication was controlled by the parties involved in the communication. The environment was not fixed and subject to the preference of the parties. It was changeable in so much as a suitable place for communication can be chosen or suggestion for change of venue can be made if the environment was a nuisance.

Results of the questionnaire survey indicated that the respondents on average agreed on all of the contributing factors as listed in the questionnaire survey had caused communication breakdown during the construction phase between consultants and contractors. The top 2 factors were variables under the category of 'project characteristic' which were 'changes in decision making' and 'inappropriate planning of project communication'. In general, the findings delineated 'personal attitude' as the main contributor to the communication breakdown with the highest mean of 3.60. Through the questionnaires, the respective category had dominated 5 of the top 10 variables to the factors contributing to communication breakdown during the construction phase between consultants and contractors. In contrast, most literature identified different interpretations and perceptions (under 'personal attitude') as the contributing factors to communication breakdown. In terms of category, 'communication method' and 'communication barrier' were the most significant category of contributing factors recorded in previous studies. This meant that individual behaviour gave the main influence on communication. Communication can only occur when an individual had the will to convey it.

Communication Initiatives to Minimise Communication Breakdown during Construction Phase between Consultants and Contractors to Achieve Project Success

In terms of 'communication development', the respondents rank 'encourage teamwork amongst project team' in Table 10 as rather effective to minimise communication breakdown than 'attend leadership training'. The selection was aligned with literature that declared on the involvement of teamwork was required in construction projects due to its unique characteristics. Literature also acknowledged communication in construction projects could be improved by enhancing teamwork amongst multidisciplinary parties of construction work. In the meantime, the result reported for the 'attend leadership training' was in parallel to the literature likewise. The literature explicated that training initiatives were in need to focus on the improvement of communication and cooperation or teamwork instead of leadership.

Table 10: Initiatives to Minimise Communication Breakdown – Communication Development.

Mode	Code	Initiatives To Minimise Communication Breakdown	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Communication Development	D1B	Encourage teamwork among project team	4.04	1		9
	D1A	Familiarise with the project's characteristics, project's context and project's contract	3.96	2		11
	D1C	Encourage communication willingness among project team	3.96	2	3.83	11
	D1D	Attend training in communication and cooperation management	3.64	3		20
	D1E	Attend leadership training	3.53	4		22

The long tabulation of initiatives under the 'communication management' of Table 11 documented that 'communication promptly for critical information', 'making an accurate decision' and 'contractors to communicate if they need further project information on time' were the top initiatives. It can be seen that respondents agree the time was a concern in managing a construction project. In the construction industry, time was money and prompt communication enable to prevent delay, incurrence in mistake and abortive work which eventually devote additional cost to the construction project. Making effective and accurate decisions unmistakably result in a positive outcome. In this matter, it was the initiatives by consultants and contractors to give accurate, clear, specific and sufficient advice for the ultimate decision-making by the client or

developer. It could also be a decision made by consultants who were appointed to represent the client during the construction phase.

Table 11: Initiatives to Minimise Communication Breakdown – Communication Management

Mode	Code	Initiatives To Minimise Communication Breakdown	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Communication Management	D2K	Communicate promptly for critical information	4.27	1		1
	D2N	Making accurate decision	4.20	2		2
	D2E	Contractors to communicate if they need further project information on time	4.16	3		3
	D2I	Re-communicate on any matter that cannot be understood	4.13	4		4
	D2J	Document all communication to reduce mistakes	4.13	4		4
	D2G	The coordinate sequence of work throughout the construction period	4.11	5		5
	D2H	Reach to an agreement for any communication dispute	4.09	6	3.98	7
	D2M	Having a regular meeting or ongoing discussion	3.90	7		12
	D2C	Exchanging contact information during site possession	3.88	8		13
	D2D	Consultants to fully delegate their design to contractors before the date of commencement	3.88	8		13
	D2A	Establish appropriate and timely communication that meets the client's requirement	3.85	9		15
	D2F	Select decision-maker among stakeholders	3.87	10		14
	D2L	Avoid communication in a noisy environment	3.64	11		20
	D2B	Develop and use communication plan or model	3.61	12		21

'Communicate to the right person' and 'practice two-way of communication rather than one-way of communication' in initiating to minimise communication breakdown distinctively bring productive effect to the communication between consultants and contractors. Message sending to the right person was undeniably effective and it was efficient to practice two-way communication hence responses were given to achieve mutual understanding and consensus between the parties. The result of the questionnaire for Table 12 above was not taking priority for the 'requesting and exchanging project information in face-to-face approach' along with 'set up visual and physical mock-up unit'.

These actions perhaps would not give a big impact on the minimisation of communication breakdown between consultants and contractors despite literature had expounded on these matters. It could be the reason that finding time for a face-to-face approach was difficult and it was not possible to be held immediately. It can be summarised that the most effective category of initiative elevated by respondents was 'communication management' with 'communicate promptly for critical information' had the highest mean.

Table 12: Initiatives to Minimise Communication Breakdown – Communication Method

Mode	Code	Initiatives To Minimise Communication Breakdown	Mean (Variable)	Ranking (Variable)	Overall Mean	Overall Ranking
Communication Method	D3C	Communicate to the right person	4.10	1		6
	D3F	Practice two-way communication rather than one-way communication	4.05	2		8
	D3H	Use various communication mediums (i.e. drawing, letter, meeting)	4.02	3		10
	D3E	Use all modes of communication (verbal, non-verbal, written, visual)	3.87	4	3.88	14
	D3G	Use formal communication channel rather than informal channel	3.80	5		16
	D3D	Use of visual communication (i.e. pictorial)	3.76	6		17
	D3B	Set up visual and physical mock-up unit	3.73	7		18
	D3A	Requesting and exchanging project information in a face-to-face approach	3.70	8		19

It was a strong argument with the top 6 variables selected by respondents of the questionnaire survey was within the category of 'communication management'. Results of the questionnaire survey for the second and third rank of initiatives to minimise communication breakdown. The collective suggestion from literature reported that consultants and contractors shall be friendly and flexible to each other. Rather than finger-pointing, they should be responsible for their work, coordinate their drawings, communication and work in a team. Most literature instead suggests to 'develop and use of communication plan and model' and implement effective 'communication method' to minimise communication breakdown. The finding of this study particularly to this research question was not consistent with the previous studies. It shows that construction parties who work in Malaysia look for enhancement in the element of 'communication management' to minimise communication breakdown during the construction phase between consultants and contractors.

CONCLUSION

In conclusion, matters relating to communication between consultants and contractors during the construction phase with commonly used communication methods were investigated, contributing factors to communication breakdown were identified and actions to minimise the communication breakdown were also suggested. Most importantly, project success can be achieved with the improvement of communication between consultants and contractors during the construction phase by the implementing action as suggested herewith. This study could provide the construction parties to get an in-depth understanding of the communication methods available within the construction industry for the application. The study will be able to encourage respective construction parties to be willing to communicate for the improvement to achieve project success. The construction players probably would start to notify their flaws and taking the initiatives actions for the improvement of their performance.

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