

Assessing Effective Project Communication Management on Construction Projects in Ghana

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Abstract: All the various stages of construction rely on professionals transferring appropriate and relevant information to develop a buildable design that meets the client's requirements. As the project unfolds and the design is realized, information in the form of drawings, specifications and construction methods must be communicated from one expert to another. Therefore, using an appropriate communication method and communication medium to resolve construction and design problems is essential. In order to fully appreciate communication in the Ghanaian construction industry, the following questions were articulated for the research: how does project professionals communicate on construction projects in Ghana? How does project professionals value effectiveness of communication on construction projects? Also, the research sort to find out whether project communication has any effect on project delivery in Ghana. The research sampled 97 professionals working with consultants, project clients and contractors with D1K1 classification. The research established that within the Ghanaian construction industry, there is a strong appreciation of the importance of project communication and its importance within the industry. Indeed, various levels and channels of communications have been established within the construction industry notably the communication between the clients and consultants or consultants and contractors. In spite of that, there have been many hindrances to effective communication on construction projects in Ghana. These includes; poor listeners, poor leadership, unclear communication objectives, unclear channels of communication, ineffective reporting system, ineffective communication between the parties on the project, stereotyping and language difficulties, limited resources to continue the project execution, lack of communication skills, political interference, lack of trust as well as religious issues. Furthermore, the research established that poor communication had resulted in project delays, project cost overrun and project abandonment. Project communications was also shown to strongly affect the performance of professionals within the construction industry. Finally, the research established that there are certain critical factors that causes project communication delays and poor delivery performance in the construction industries among which includes: poor communication between contracting parties; lack of complete document before commencement; contractors improper planning during construction; poor supervision of work on site; materials procurement difficulties; underestimation of the project duration; errors in design and specification; underestimation of the project duration; insufficient financial resources of clients; bureaucracy in decision making and change orders during construction.

1.0 INTRODUCTION

1.1 BACKGROUND

The growing interest and demand for public construction services in Ghana constitutes an indication of the industry's significance to the country's socio-economic development. However, the industry is plagued with project failures in terms of project delivery. Scholarly evidence indicates that the diverse nature of construction projects including the multifaceted nature of construction projects makes planning, forecasting, managing and controlling of projects more difficult but essential (Smith and Jaggar, 2007). The stages of construction rely on professionals transmitting relevant and appropriate information to develop building designs that meet the requirements of clients (Gorse and Emmitt, 2003). As projects unfold and designs realized, information such as drawings, project specifications and methods of construction must be communicated between experts. In other words, information must be transferred and understood in order for the various aspects of construction projects to be assembled to realize the project design. In Ghana, the construction experts regularly engaged in the industry are Architects, Geodetic Engineers (GE), Quantity Surveyors (QS), Electrical Engineers (EE), Structural Engineers (St.E) and Services Engineers (SE). Such professionals are regulated by their respective professional institutions such as the Ghana Institute of Architects (GIA), Ghana Institution of Surveyors (GhIS) for the quantity surveyors and Geological Engineers, and the Ghana institution of Engineers (GhIE) for the Engineers. According to Ali et al. (2009), there are several examples to support the assertion that communication is important in ensuring the success of construction projects. For instance, effective communication between the project team helps to maintain a good relationship between the participants to ensure the success of the construction project (Ceric and Selberherr, 2011). Napier et al. (2009), cited in Ali et al. (2009) intimated that 95 percent of all problems encountered in projects are caused by poor communication and that the relevance of being capable to handle the skills of communication during the presentation of facts, details, status, project requirements, etc. should be prioritized in construction management. Again, Zülch (2012) stated that the issue of communication in the construction

industry is of maximum importance irrespective of the fact that projects are planned, organized and managed by experienced and qualified personnel. Accordingly, failure in project communication can lead to the failure of the project as whole.

Communication does not only aim to keep members of the project team updated in terms of progress but to as well enhance the ownership of project decisions (Gann and Salter, 2000). Lee et al. (2011) stated that the delivery of project and the performance of the construction industry is hinged to a large extent on the methodology of how the knowledge and the experience of the many people involved in the construction process can be integrated as a team. Accordingly, the development of effective communication systems throughout the construction process will ensure the flow of quality and reliable information (Ibid.). Indeed, Ochieng and Price (2010) indicated that communication in an environment which is project driven presents several challenges. In an industry such as construction, interaction is mainly characterized by unfamiliar groups of people who come together in a purpose driven environment within short periods before they are divided into several groups to perform their various roles towards the achievement of a construction project. The construction industry is not only deemed to be resistant to change, but also the industry as a whole is lacking efficient and effective communication (Landin and Kindahl, 2013). And in an industry where managing and monitoring projects demands collaboration and coordination between parties for successful delivery of projects, effective communication and communication practices of construction firms cannot therefore be downplayed (Sumer et al., 2012). The study defines communication as the exchange and flow of information and ideas from one person to another; involving a sender transmitting an idea, feeling or information to a receiver Tyagi et al. (2018). In recent years, reports by the Government of Ghana and donor agencies have continued to explore poor performance within the construction industry with many projects failing to exceed the expectations of clients (Nielson and Tierney, 2003). As a result, most studies on the industry has focused mainly on the influence of factors such as procurements, health and safety, access to credit, performance improvement on construction performance. Beyond these, very little or no studies have been conducted on other factors such as construction communication and how it affects the construction industry in Ghana.

A pertinent barrier that organizations face is how to resolve the problem of information flow (upwards, downwards, and sideways), often termed effective project communication in construction industries. In modern day construction, some of the important elements contributing to the poor performance of the construction industry that have been identified are ineffective communication practices, the organizational fragmentation and the lack of integration between design and construction processes (Powell et al., 2006, Ochieng and Price, 2009).

Project team members have always listed communication as one of the integral areas required for improvement during post-project assessments (Massis, 2010). They additionally stated that often times, project team members regarded troubled projects to have run smoother had communication management practices been better.

Communication management forms part of the ten knowledge areas that are advanced in the Project Management Body of Knowledge (PMBOK) of the Project Management Institute (PMI). Indeed, the PMI have developed a Communication Management Overview with clear guidelines regarding inputs, tools and techniques, and outputs towards effective communication management on projects. However, construction today has become more technologically complex, structures are bigger, higher, built in more crowded places, combine more advanced systems in an increasingly dynamic environment (Danek et al., 2008). Subsequently, there is increased flow of information between many people at any specific time. This is an obvious upgrade in the demand for communication (Danek et al., 2008). There is therefore the need for the continuous development of frameworks that integrates the ever changing features and characteristics of a project. According to Ojiako et al. (2008), the construction industry is suffering from project communication management issues such as; the inability to determine project stakeholders' needs for information; inability to determine communication channels, insufficient interaction between team members and inappropriate communication media. Also, Bandulahewa (2015), stated that the practice of communication requires, communication planning; information distribution; performance reporting; and managing stakeholders. However, these activities are not given the needed attention by construction managers partly because construction industries seem not to be aware of these practices; thus, communication is not given much attention among professionals and hence the use of communication plans are relatively rare (Bandulahewa, 2015). According to BR E (2011), defects in the construction industry are often the result of poor communication such as poorly detailed drawing, unavailability of technical information or incorrect instructions given to operatives. However, what remains unknown is how and the extent to which project professionals collect and disseminate information in a timely manner, when handling construction projects in Ghana. It is against this background that the research seeks to assess and address the noticeable gaps or barriers to effective project communication in construction industries in Ghana. In Ghana's construction industry, communication is important, broad and could involve a lot of work. The construction industry in Ghana comprises several players including contractors, consultants and clients, involved in construction projects such as roads and building projects. The study will focus on the players within the building sector because the building sub-sector is more developed locally than the road construction sector (OWUSUAH, 2012). Moreover, there will be further concentration on the bigger construction firms within the building sub-sector because they are presumed to effectively use all the possible communication structures the study will employ. Also, one of the major limitations to this research work is financial and time constraints in conducting this research project.

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

Having established the bases for the conduction of the study, it is important that literature on construction project communication is adopted. This chapter will therefore concentrate on the theories governing construction communication. It will consider the nature of the construction industry in an attempt to draw the line in respect of its significance and the need for research and development to improve the industry. To understand the concept of communication and how it is managed, it is important that the industry within which communication is practiced is understood. Communication is a basic human right. It points to the basic need of every person to express their thoughts about any subject matter. Since all democratic relationships presume mutual interactions, it can therefore

be argued that there can be no relationship without dialogue. Individual members or a group of professionals therefore need interpersonal communication in order to accomplish productive and social functions within organizations.

2.2 ECONOMIC SIGNIFICANCE OF THE CONSTRUCTION INDUSTRY

According to Andreff and Szymanski (2006), the construction industry can be divided into subsectors of three. These are, the construction of buildings; road, highway and other infrastructure construction; and specialty trades. The construction industry is large, dynamic, complex, have several stakeholders and plays important roles in the development of nations. It serves as an employment avenue in which its activities are performed by this workforce. Its work can include the construction of new structures and the performance of renovations, additions, alterations, or the maintenance and repair of structures (Akunyumu, 2017). The national socio-economic development goals of countries can be supported by the activities of the construction industry. This is because the construction of hospitals, schools, townships and other infrastructure which are the core mandates of every government for its people is carried out by the construction industry (Vickers et al., 2013). The relationship between governments of economies and the construction industry towards economic development can be described as rather symbiotic – government provides the fund and

the construction industry constructs the projects. The importance of the construction industry is not limited only to the fact that it provides the infrastructure of other industries but also that it is sizeable in its own rights (OECD, 2008). The construction industry is fundamental to the existence of other industries since the environment within which they operate is provided by the construction industry. The workers of the industry have the responsibility to construct the structures that serves as a safe environment for people working in other industries to work and provide services ((Uwuigbe et al., 2012, Tipili and Ilyasu, 2014). The construction industry is a main employer of many economies across the globe. In Europe, it accounts for about 7% of the workforce and in the EU. A total of 40 million people are employed by the construction industry in America and Japan combined (Tipili and Ilyasu, 2014). This employment rate has a link to the output generated by the construction industry in several countries. According to the International Labor Organization, ILO, (2001), the output of the construction industry worldwide was estimated at a little over \$ 3,000 billion in 1998. This output is hugely concentrated in the high income countries (Western Europe, North America, Japan and Australia). In Europe alone the High income countries contributed 30% of the total output. Japan and America contributed 22 and 21% respectively. Whereas china and India contributed 6% and 1.7% respectively. Africa contributed about 3% of the total output worldwide within the same period (ILO, 2001). Despite the contribution of the construction industry to several countries, it is not without challenges. The challenges that confronts the industry is that which emanates from several areas. From the economy of countries to the management of its own activities. In the quest to provide solutions to the several challenges that confronts that industry, several researches have been conducted. Notwithstanding though, these challenges still persist and now borders on those whose interest is to see a vibrant industry to do something. It is in view of this that this study is being conducted to propose a framework to help construction practitioners plan their communication.

2.3 CONSTRUCTION PROJECT AND COMMUNICATION

Construction projects are complex and their performance is affected by several factors (Fallrø, 2013). And according to (Laufer and Girsai, 2008), the complexity of construction can be divided into Technological Complexity and Organizational Complexity. Current construction projects have become technologically complex; structures are bigger, higher, built in crowded places and uses the combination of advanced systems. Subsequently, there is increased flow of information between many people at any specific time. This is an obvious upgrade in the demand for communication. The organizational complexity is the rate at which complexity grows with the proportional increase in the number of sub-organizations and the way they depend on each other (Laufer and Girsai, 2008). Construction Projects have been defined by several authors of various research studies. According to Lim et al. (2013), a project consists of a group of tasks, duly executed within a defined period, with the utmost aim of achieving the set objectives of the project. A construction project is characterized by several features. These include the likelihood of it being a one-time program, having a specific start and end date, performed within a determined budget and several resources albeit scarce and have to be shared among others. Another profound definition was offered in the BS 6079-1 (Guide to project management) which stated that a project is a unique set of coordinated activities, having defined starting and finishing times, undertaken by an individual or organization to achieve specific objectives within schedule, cost and performance parameters (Kanal et al., 2007). The Project Management Body of Knowledge (PMBOK) of the Project Management Institute (PMI) defined a project as a 'temporary endeavor undertaken to create a unique product, service, or result (Institute, 2008). For the said product to be realized several parties and stakeholders are involved which have been found to be a source of worry for the performance of the project. The performance of each party is linked and have an impact on the performance of the overall project Sezginer et al. (2014). Construction projects are undertaken by contracting and sub-contracting and the building of alliances. Several stakeholders are involved in the conception of projects and the process of designing, financing, building, managing, upgrading and replacement. This comes with the need for communication and cooperation (Aulich et al., 2013). Communication is said to have taken place when message sent is interpreted by the target recipient. Communication can therefore be said to be dependent on the recipient (Aulich et al., 2013). The effective communication among the participants of a project have been identified to be critical and fundamental to the success of construction projects. In construction, communication have been complicated by a number of factors (Aulich et al., 2013). The stages of construction that involves design and project execution is a social act of collaboration that thrives on interaction between stakeholders. Professionals are gathered through projects at all levels of groups and individuals. The collaboration is enhanced by the use of several tools of communication and media. The success of the project is linked to their ability to interact effectively (Gorse and Emmitt, 2007). According to Li et al. (2009), construction communication span time and space, and it is a multi-level, multi-faceted problem. In construction, the largest volume of communication that takes place occurs during the construction phase. Communication is fundamental to project success and borders on construction professionals to implement (Denis et al., 2001).

2.4 COMMUNICATION DEFINITION

Communication is regarded as a complex system and three elements that can be identified in every system includes, input, transformation of input and the output of the input in a new format (Gillard and Johansen, 2004)). Bandulahewa (2015), indicated that communication is an important skill and a managerial tool for success in the construction industry. According to (Perumal and Bakar, 2011), communication can be defined as the process through which a message is encrypted and imparted by a sender to a receiver using a channel or medium. This process of transmissions may either occur between individuals or between organizations in the construction industry ((Baran et al., 2012)). The concept of communication is seen as a two information exchange. The sending of information to another party alone does not constitute communication. But communication is established when the recipient of the information responds to the information ((Baran et al., 2012)). The intrinsic characteristics of communication has been made bear by some researchers who described communication as a process (Velentzas and Broni, 2014). In another study, Velentzas and Broni (2014) emphasizes the significance of communication to managers, and points out that the ability of managers to effectively communicate is vital to project success. It is also significant to note that project personnel such as engineers and technical personnel spend majority (50%-75%) of their time in verbal communication.

2.4.1 CHARACTERISTICS OF COMMUNICATION

According to Borgatti et al. (2009), some characteristics of communication are;

- Communication is a continuous, on-going and dynamic process.
- Communication requires a sender and a receiver.
- Communication has an information, specifically a message or content.
- Communication requires a medium such as symbols, signs, behavior, speech, writing or signals.
- Communication requires shared understanding where all the parties understand the content or message of communication the same way.
- Communication is transactional and irreversible in nature.

2.5 THE NATURE OF FORMAL AND INFORMAL COMMUNICATION

Theorists have recognized that organizations employ varying communication methods. The varying communication method employed could result in uncertainty. However, matching the informality of the methods with the uncertainty of the task could lead to better organizational outcomes. At the organizational and small group level, coordination of activities is a production-oriented task that some studies have examined in detail. In an earlier study, Blau and Scott (2003) defined coordination as the activity of directing individuals' efforts towards achieving common and explicitly recognized goals. The importance of such informal communication systems is their lack of pre-specification. That is, information is not pre-packaged and then shipped to recipients. Additionally, courses of action are not pre-computed and executed without any adjustments. Rather, information is often exchanged in an interactive process such as through meetings and conversations, with courses of action worked out in the context of the circumstances into which the actions must fit. Table 2.1 below illustrates several variables that distinguish formal from informal communications. At the heart of informal communication is an ad lib nature. That is, conversations take place at the time, with the participants and about the topics at hand. None of the above highlighted characteristics is scheduled in advance. Moreover, during its course, the communication could change to reflect the current interest and understanding of participants. In this regard, informal communication could be characterized as truly interactive, with participants in communication being able to respond to what they perceive as the current state of affairs, including the communication up until that point, and their perception of the reaction of other participants in a communication process. Through established feedback mechanisms, it is possible for informal communication to be more effective than formal channels.

Formal	Informal
Scheduled in advance	Unscheduled
Arranged participants	Random participants
Participant in role	Participant out of role
Preset agenda	Unarranged agenda
One-way	Interactive
Impoverish content	Rich content
Formal language and speech register	Informal language and speech register

Table 2.1 Shows the formalities dimensions of communication (Source: Kraut et al., 1990)

2.6 IMPORTANCE OF EFFECTIVE COMMUNICATION

Communication is the glue that holds a project team together. Communication is not just talking. It is also listening. Without clear, timely, unambiguous communication, even a small team working together will have major problems. In the case of a virtual team, poor communication will render an already challenging situation nearly impossible to control. The project status needs to be tracked and monitored effectively using various tracking tools. He/she should ensure timely and appropriate generation and collection of information. He/she should follow email ethics during formal written communication. Being precise and clear while communicating helps achieve better understanding. The law of success says 35% Hard skills + 65% soft skills = 100% success (Statistics courtesy – Harvard Business School). As a project manager, one should know there are potentially hundreds of communication channels. The larger the project, the greater opportunity for communications to break down. Here's a nifty formula to find out how many

opportunities there are for communication to fail: $(N*(N-1))/2$. That's N times N-1 divided by 2. N represents all the key stakeholders. Effective communication includes a well-designed infrastructure and the processes, messages, and documents that use that infrastructure to exchange information among project stakeholders and keep them aligned with the project goals and informed of the project's progress.

2.6.1 Project Communication Management

The goal of Project Communications Management is to ensure timely and appropriate collection, storage, distribution and generation of project information. Communication is so important on projects that it is an integral part of a successful project. Every project should include a communication management plan – a document that guides projects communications. This plan should be part of overall project plan. The type of communication will vary with the needs of the project. An effective Project Manager spends most of her/his time in Communication.

According to the PMBOK guide, a Project Manager spends 70-90% of her/his time in communication during a project. Communication Management needs to be planned during the beginning of the project. Communication Planning involves determining the information and communication needs of the stakeholders;

- Who needs what information and when
- What type of information will they need and in what detail?
- What will your goal be when you communicate and how the information be provided to them.

2.6.2 Communication Process

A Communication Process, or Communications Management Process, is a set of steps that needs to be adopted for every project in an organization. A communications process can be undertaken as part of Communications Management and it helps to ensure that the stakeholders are kept regularly informed. For example, as part of the project life cycle, the team implements a communication process to make sure that the entire team is kept informed on the status of the project. If the right people have to be kept informed with the right information, at the right time, then this process needs to be adopted.

2.6.3 The Elements of the Communication Process

Communication is the process of exchanging information, thoughts and feelings between people via interaction, writing or body language (Lunenburg, 2010, Velentzas and Broni, 2014). The definition reiterates the fact that without an understanding of the information transmitted, communication cannot be said to have occurred (Lunenburg, 2010). Communication can take many forms. However, irrespective of the form in which information is communicated, the elements of sender, receiver, channel or medium and the message are always present (Velentzas and Broni, 2014). In the communication process, the message being communicated flows from the sender who encodes the message and transmits through a medium/channel by either a verbal or non-verbal method, to the receiver who decodes the encoded message (Zulch, 2014). In the process of communication, noise and barriers acts to make the transmission difficult. This process is illustrated in the figure 2.1 below.

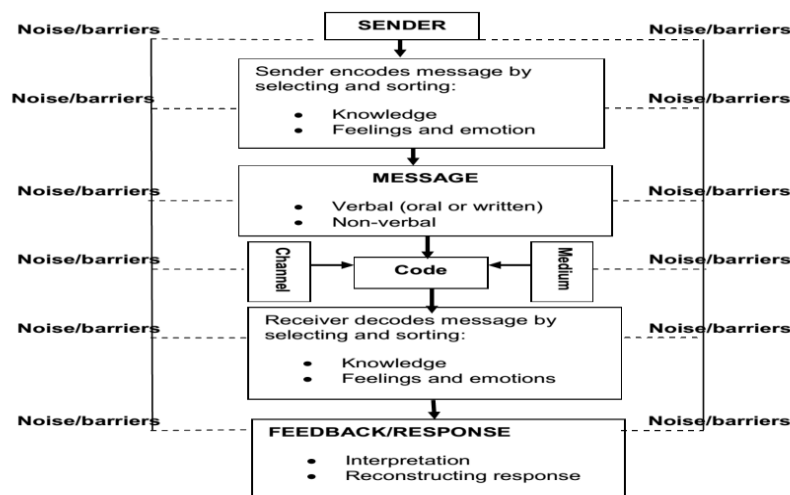


Figure 2.1: The Communication Process Diagram Source: Zulch (2014)

The process of communication and the transmission of information begins with the sender. The sender acts as the sending party and sends the message. This message can include ideas, thoughts, pictures and emotions (Cappellari et al., 2012,). The sender encodes the message which may take any form (verbal or non-verbal). Encoding involves the conversion of feelings, ideas, and thoughts, numbers or phrases to express oneself (Saslow et al., 2007) emphasized (Zulch, 2014). Stated in other words, encoding means that the intended message is embedded in a linguistic code (word, sign or both) to form the message. Hence it is important that the act of encoding is done in a language that conveys or communicates (Khan et al., 2003). Once encoded, the message is transmitted through a medium/channel. Medium refers to the means of communication used (eg. Spoken, written, graphic etc.). The channel refers to the conduit through which the message is conveyed (Powell et al., 2006). This channel can take many forms: during face-to-face interaction, on the telephone, through printed materials or visuals (televisions, photographs). The communicated information is then received by the target recipient. The receiver decodes the message to understand what is communicated. Decoding is impacted by the prior experience of the receiver and the frames of reference (Guo and Sanchez, 2005). Decoding a message requires

communication skills such as the ability to read and comprehend (written), and ability to listen carefully or ask questions when needed (MTD Training, 2010). The communication process is said to be complete when the receiver has received the message and offers a response (feedback) to the sender of the information. When the receiver decodes the message as intended by the sender, there is the matching of ideas of both parties and the likelihood of the receiver sending a response to the sender (Pfeiffer, 1998). Communication is said to be one-way when there is no feedback from the receiver. Two-way communication is when the feedback is offered. A feedback is not a mere acknowledgement of the message as it must contain as much content as desirable for the comprehension of the receiver. It is difficult to know if the message communicated is received and understood without feedback (Lunenburg, 2010, Denis et al., 2001). However, at each stage within the communication process are barriers/noise. Noise is described as anything that obstructs or distorts the message. Noise in the communication process is inevitable (Wood et al., 2010, Lunenburg, 2010). (Wood et al., 2010), stated that four kinds of noise exists in communication. They are classified into Physiological Noise (distortion by hunger, fatigue, headaches, medications and other factors that impacts the thinking process of the physical being), Physical Noise (noise made by others, extreme temperatures, crowded conditions), Psychological Noise (qualities that impact communication and interpretation of others), and Semantic Noise (jargons, when words are not understood) (Wood et al., 2010).

2.6.4 Improving Project Communications

You have seen how a good communication is vital to the management and success of information technology projects. It is also explained above the importance of project communication management, which can ensure that the essential information reaches the right people at the right time. Some of the areas to be considered for improving project communications are:

- Communication skills to resolve conflicts
- Developing better communication skills
- Using templates for project communications
- Developing communication infrastructure
-

2.6.5 Communication Skills to Resolve Conflicts

It is crucial for project managers to identify and resolve any kind of conflicts in projects. Conflicts could be due to project priorities, technical issues, project issues, personalities, staffing, procedures and process. There are five basic modes for handling conflicts in project communication as mentioned below:

Confrontation Mode: When using confrontation mode, the project manager will directly face a conflict using a problem-solving approach that allows them to work through the disagreements. This approach is also called as problem-solving mode. It is a win-win situation mode and is the most favored mode used for conflict resolution.

Compromise Mode: With the compromise mode, the project manager uses a give and take approach to resolve the conflicts. In this both the parties will bargain and search for solutions that brings satisfaction to some extent.

Smoothing Mode: With the smoothing mode, project managers will place emphasize on areas of agreement and avoid areas of disagreement. **Forcing Mode:** With the forcing mode, project managers will force their viewpoint. It is a win-lose situation and managers who are autocratic in nature favor this mode. **Withdrawal Mode:** With the withdrawal mode, project managers will withdraw from a disagreement. This approach is least desired. Research has indicated that confrontation mode is most widely used for conflict resolution followed by compromise mode. Successful project managers are less likely to use the other 3 modes for conflict resolution.

2.6.6 Developing Better Communication Skills

Most companies spend a lot of money in conducting technical trainings and give less importance on soft skills training like communication training. It is quite rare to find information technical professionals with the ability to apply both good technical and communication skills. Communication skills are the key to advancing their careers especially if one wants to be a good and successful project manager.

Communications skills training include role-playing activities in which participants learn concepts such as building rapport. It takes leadership to help improve communication in employees. Senior management shouldn't let their employees write bad documents, sloppy reports, give horrible presentations or conduct meetings with no proper agenda/objective. Often people complain about the time they waste in unnecessary or poorly planned and poorly executed meetings. Meetings conducted with the team or client can be made effective by following some simple guidelines as listed below:

- Define the purpose and outcome of the meeting
- Determine who should attend the meeting
- Provide an agenda to the participants before the meeting
- Prepare handouts, visual aids related to the discussion if required before in hand and distribute to the participants
- Execute the meeting professionally
- Build relationships

Senior management should expect high expectations and be a role model. Organizations should allocate time and budget for conducting trainings, provide staff to assist in relationship management and include time in projects to have informal meetings with clients to help develop relationships. Like any other goal, communication can be developed better and improved with proper planning, support, and leadership from senior management.

2.7 CHANNELS OF PROJECT COMMUNICATION

During the lifecycle of a project, communication can occur in various directions depending on who is communicating. Communication could be upward in nature where subordinates transmit messages to management within an organization. There could also be lateral communication between customers or employees, and within project teams. On this basis, there is the need for effective communication channels, either downward communication (from superior to sub-ordinate), horizontal communication (between colleagues) or upward communication (from sub-ordinates to superior) to be put in place to facilitate the transfer of messages or feedback between project team members and management. According to (Borgatti et al., 2009), communication will always involve more than one person. Figure 2.2 below illustrates the channels of project communication.

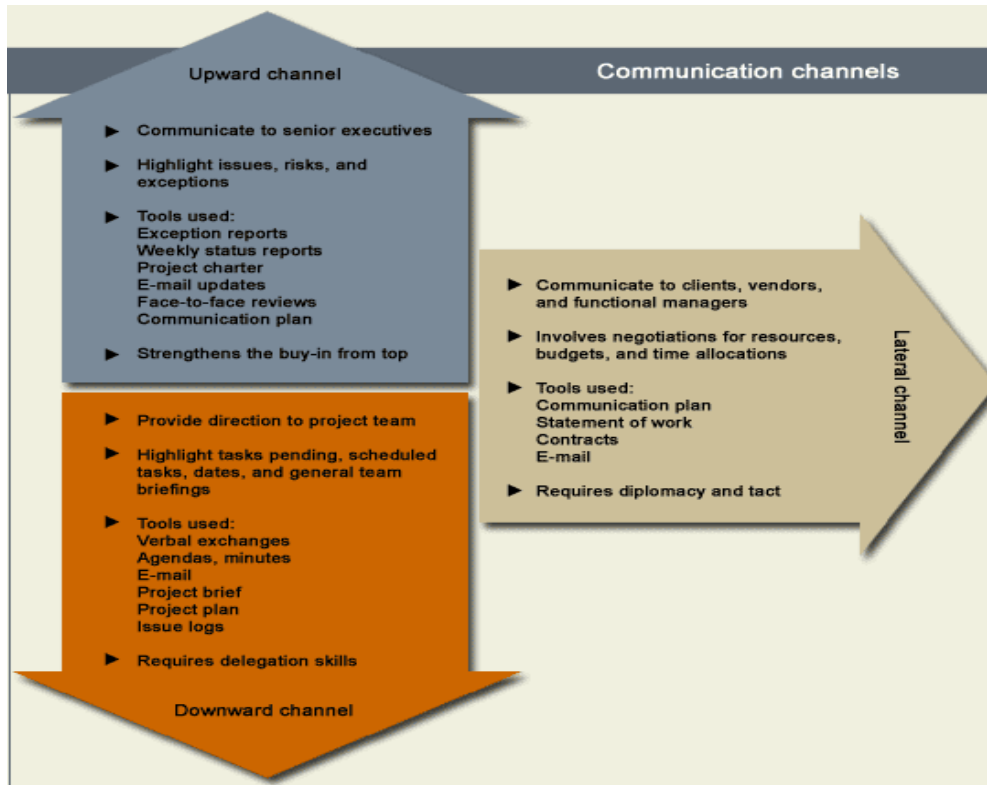


Figure 2.2: The three communication channels of the project manager (Adopted from Keyton, 2011).

2.8 PROJECT COMMUNICATION CHANNELS IN CONSTRUCTION INDUSTRY

There are several mediums of communication that can be used at any point in time to depending on choice and the characteristics of both the sender and the receiver of the information communicated. According to Butali et al. (2013), the channel of communication selected for the transmission of a particular information depends on the time available, expenditure involved, the urgency associated with the information, intellectual and emotional state of both the sender and recipient. It also depends on the stage of the project or the activity undertaken (Gorse and Emmitt, 2003). The channels of communication usually used on construction projects can be classified into formal and informal (Posea, 2012, Andreff and Szymanski, 2006).

2.8.1 Formal Channels of Communication

(Butali et al., 2013) defined a formal channel of communication as communication that is defined in the formal structure of an organization mainly for the transmission of goals, policies, procedures and directions. The formal channels of communication explain the relationship that exists in the nature of organization between the team members (Posea, 2012). Majority of information that is communicated during the construction period usually flows either through the architect or contractor. Mostly design information's are communicated through the architect whereas building and assembly information are obtained through the contractor (Walker et al., 2009). The procurement route and the contractual arrangements are thought to be the determinants in the rate at which formal communication channels are formed on construction projects. Formal communication channels are thought to be pre-designed and imposed on the project team rather than evolving. Nonetheless, there is the likelihood of project participants introducing their ideas when they communicate (Gorse and Emmitt, 2003, Powell et al., 2006). The formal communication is usually complicated by the adoption of informal communication channels mainly to overcome the complicated and bureaucratic nature of the formal communication routes(Gorse and Emmitt, 2003). According to Tubbs and Moss (2008), there are four directions in which formal communication flows. This include downward communication, upward communication, Horizontal Communication and Diagonal.

2.8.2 Downward Communication

This communication can also be described as vertical communication as information flows from higher levels to lower levels mainly for issuing orders, broadening of ideas and communicational knowledge (Turkalj et al., 2010). This downward information

communication refers to several issues. It includes directives, instructions, policy procedures mainly for the implementation of goals and objectives (Zulch, 2016). This form of communication has the likelihood to be filtered, modified or halted at each levels in the quest for managers to decide what information should pass to the employees (Zulch, 2016).

2.8.3 Upward Communication

The kind of communication that flows from the lower levels to the upper levels within an organization is known as upward communication. It is utilized to bring to the attention of managers of what the subordinates are feeling (Wang et al., 2011). Its use can also include the relay of information mainly related to the proposals system, employees' opinion, work insight and issues relating to employees' problems Wang et al. (2011), upward communication has not been utilized fully because of employees' fear of reprisal, employees have the feeling that their concerns are filtered/modified when they communicate and managers lack of time to listen to the concern of employees.

2.8.4 Horizontal Communication

Horizontal or lateral communication is the communication that takes place among employees/supervisors at the same level in an organization (Nualsri and Chaiya, 2016). Horizontal communication enhances coordination. Horizontal communication enables one employee to work with another without having to follow the rigidly setup procedures (Nualsri and Chaiya, 2016).

By the nature of horizontal communication, activities that borders on common objectives can be easily synchronized without the intervention of managers of the higher ranks (Posea, 2012).

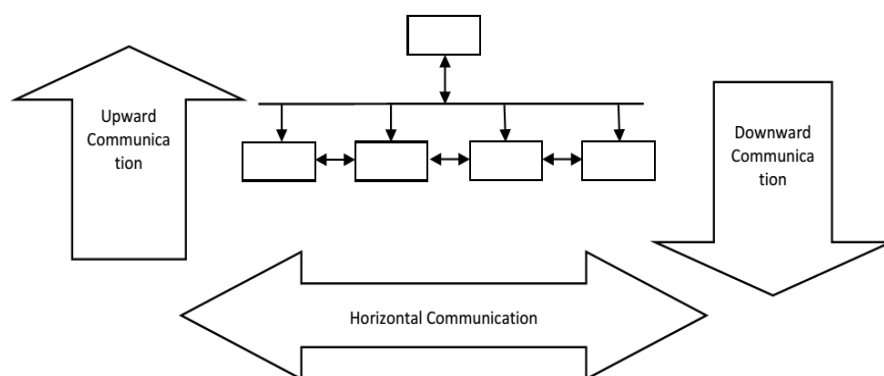


Figure 2.3: Shows Directions and Channels of Communication Source: Lunenburg (2010).

2.8.5 Diagonal Communication

Diagonal communication takes place between superiors and workers not located on the same hierarchy/level (Nualsri and Chaiya, 2016). This communication is achieved when members of the organization cannot communicate through the other channels. By utilizing this communication route, there are savings in time and cost and the added advantage of utilizing informal relationships (Posea, 2012).

2.8.6 Informal Channels of Communication

According to Shklovski et al. (2004) communication is considered informal when the rules and hierarchies and the coordinating activities are ignored. Such communications are considered to be spontaneous, interactive and rich. For coordination to be properly done, there is the need for informal communication as it is dependent on for human necessities: (a) physical presence, (b) the need to communicate, (c) the sense of belongingness to the group and (d) the hierarchy Cho et al. (2011). The informal channels of communication are deemed unofficial and the data transmitted is not verified. The informal means of communication has increased speed, fills organizational gaps, maintains linkages, handles one-time-situations and efficient even though the data it may carry may be of the 'gossip' type (Cho et al., 2011, Massis, 2010). Cho et al. (2011) stated the characteristics of informal communication as;

- Having no permanent structure
- Suggests how communication networks actually work
- It can route around to damage formal communication networks
- Its situational and spontaneous
- It can create its own organizational structure.

Figure 2.4 provides a pictorial representation of the formal and informal channels of communication in construction. It depicts how organization chart is not a good representation of communication among people and who may possess power in an organization. Communication between people may not follow a particular pattern and can move through parts of the structure and side-stepping others, thereby defeating established formal communication protocols (Powell et al., 2006).

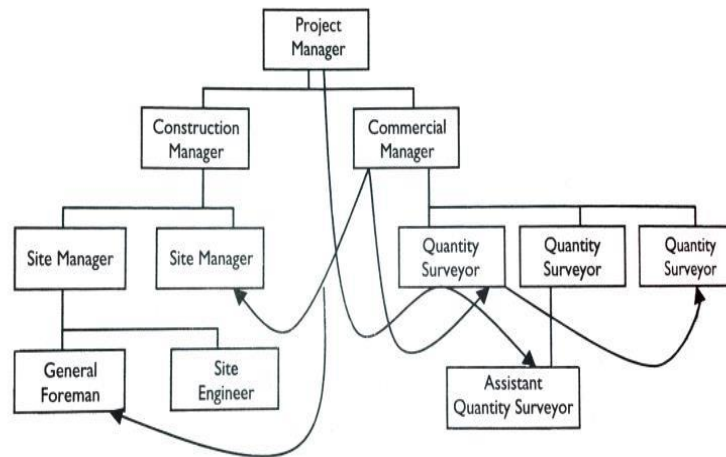


Figure 2.4: Shows Formal and Informal communication routes in a project communication Source: Dainty et al. (2006)
The advantages and disadvantages as well as the usage periods of formal and informal communication routes have been offered by (Walker et al., 2009) and summarized in Table 2.3 below:

Communication Route	Advantages	Disadvantages	When Used
Formal	<ol style="list-style-type: none"> Provides project historical records. Provides control for the project. Provides contractually obligatory process 	<ul style="list-style-type: none"> The movement of information is slow. Bureaucratic as there are several steps in the transmission of documents. The gap between the needed information and the information available can lead to errors and changes. Difficult to use in all situations as it may prove ineffective in providing solutions in urgent situations. Iterations concerning approval of submittals and changes cannot be handled effectively with formal channels of communication. The exchange of information is vertical and only horizontal at the top making distance documents travel long. In the formal route small pieces of information's is not provided (i.e. only completed submittals travel through the formal process. 	<ul style="list-style-type: none"> When records of historical nature are required. When obligations that are contractual are to be fulfilled When there is the need for approvals. When there is the luxury of time (i.e. no urgency for information. When the transfer of small pieces of information are not required. When uncertainty is low.
Informal	<ul style="list-style-type: none"> The process of communication is very fast Iterations of information is reduced. Small pieces of information can be transferred or communicated Time for communication is reduced as this nature if communication takes place in a horizontal pattern. Direct communication with decision makers. Time for review is reduced as discussions result in understandings 	<ul style="list-style-type: none"> It is usually not recorded. Not recognized contractually The loss of information is possible. Misunderstandings may arise. It is "Chaotic" in nature Initiated by individuals and therefore subject to various perspectives. It is not well established (based on how individuals find suitable) Requires trustworthiness to be established 	<ul style="list-style-type: none"> When solutions are needed in urgent situations. When pieces of information is required. When there is interdependency between the tasks and the personnel involved requires communication. When uncertainty of information is present and requires communication to reduce uncertainty When reduction of

	and decisions made. o Action may be undertaken based on informal agreement. o Provides grounds for resolution of conflicts before formalization and getting entrenched in position. o Different perspectives are allowed under informal communication routes.		iterations of information is required o When preparation time of works is required to be reduced (e.g. submittals)
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Table 2.2: Shows Formal and Informal routes of communication Source: Barakat (2009)

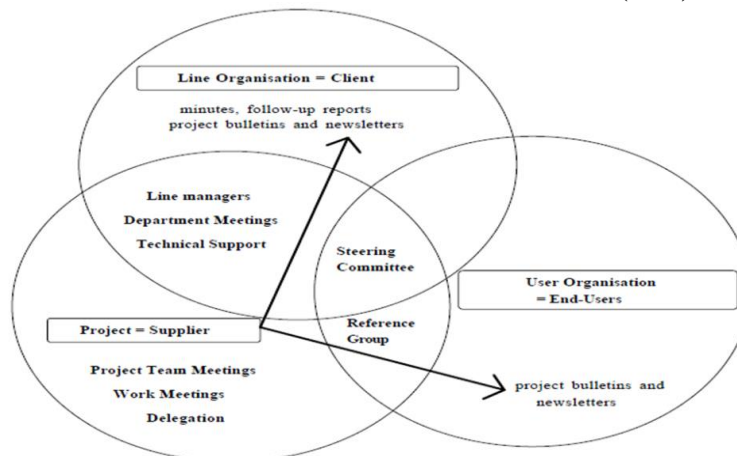


Figure 2.5: Shows Communication Channels in a Project (Adopted from Ruuska, 1994)

Figure 2.5 above, adapted from Ruuska et al. (1994) illustrates a project, a client and an end-user. In the intersection it is possible to see the parts of an organization through which collaboration between the three groups usually takes place. The arrows show how a project handles written information to the line and end-user organizations. Together these elements can be regarded as the project's official communication channels.

2.8.7 Reporting System in Project Communication

A project's reporting system in figure 2.6 which was adopted from Sell (1980) has basically two tasks. First off, The issue of functional management is rarely the lack of information but rather its overload results in the loss of information. Consequently, functional management is often interested only in the outline of the time schedule (milestones), accumulated costs and the quality of the end product in general level. Details are not needed. In the worst case they may cover up more important issues and thus decrease the informativeness of the report (Zulch, 2014).

2.8.9 Internal Project Communications

In a project lifecycle, internal communication has two emphases: the steering committee and the project team. A steering committee is the top decision making forum in a project. Its task is to control and support the project manager. Inter-personal exchange of information between the project and the client organization and also the end-user organization takes place in the steering committee. Although the majority of the official decision making takes place in the steering committee, the cooperation between the project manager and the steering committee should not be limited only to the meetings. By keeping contact to key members of steering committees during meetings, a project manager can ensure that steering committee is up-to-date on the project's performance and that the decision making mechanism will progress smoothly when it is needed. Within the project group, effective communication is based on the key factor of the project leadership: manage by walking and talking. More official ways to communicate are the regular project team meetings, memos and follow-up reports. Although a follow-up report can also serve a project's external communication goals, it still has more importance as an internal communication channel.

2.9 METHODS OF PROJECT SITE COMMUNICATIONS

There are several means of communication used on construction sites used by both top management communication and communication amongst the various participants and these methods have been identified in earlier studies. (Walker et al., 2009), conducted a case study into two mega projects in Dubai. The methods of communication used on those projects included face-to-face, meetings, email, correspondence and phone. Other researchers have also classified these methods of communication. Perumal and Bakar (2011) classified the means of communication under verbal communication and written communication. Billström and Cederqvist (2012), also conducted a study and sought the perspective of consultants on the channels of communication used in construction projects. They stated face-to-face communication, video conference systems, project planning documents, meetings,

project portal, email and telephone as the tools or channels of communication. At the project level, the Project Management Institute also classified the methods of communication into Interactive communication (e.g. meetings, phone calls, video conferencing), Push Communication (letters, memos, reports, emails, faxes, voice mails, press releases etc.) and Pull communication (intranet sites, e-learning, and knowledge repositories) (Institute, 2008). Cho et al. (2011) also in his study into the shared knowledge within the informal communication network also classified the channels of communication into verbal, non-verbal and technology aided communication. From the literature these methods of communication are summarized in Table 2.4 below:

COMMUNICATION METHOD	AUTHOR(S)
Face-to-face	Barakat (2009); Billström and Cederqvist, (2012); Mehta, (2002); Vasanthi and Abu, (2011); Gorse, et al., (1999)
Phone	PMI (2008),
Correspondence	Barakat (2009); PMI (2008)
Meetings	Billström and Cederqvist, (2012), Mehta (2002)
Memos	PMI (2008)
Faxes	PMI (2008)
Videoconference	PMI (2008); Billström and Cederqvist (2012)
Email	PMI (2008); Mehta (2002); Barakat (2009); Ergen (2011)
Project Intranet	PMI (2008)

Table 2.3: Shows Means of Communication Source: Author’s Construct (2020)

2.9.1 Face to Face Meetings

Face to face communication is the personal means of communication where parties have the capability to respond to signals of the counterpart (Routledge et al., 2011). This communication method enables the recipient of the information to hear and see the nonverbal cues conveyed by the communicator for immediate feedback (Lunenborg, 2010). In face to face discussions, the conversation between the parties are more personalized and the distinction between superiors and subordinates appears to be rather unrecognized. Subsequently the parties to the communication feel comfortable with the sense of “ownership” of the issues communicated (Sarwar and Abugre, 2013). Face to face communication have been found to be effective under uncertain conditions. According to Wallinga et al. (2000) organizations use face to face communication in situations where there is high frequency of uncertainty. Within the project team, members use face to face communication to obtain construction information to remove uncertainty. The situations and construction drawings may be complex. Face to face communication has been noted to be the most effective way of interpreting those complexities to remove the uncertainties (Liu, 2009). Face to face communication have been found to be an effective way of communication and information transfer in the construction industry (Cho et al., 2011). Face to face communication provides the grounds for immediate recognition of whether the information is understood. For instance, in a situation where a specialist is explaining a problem, he or she is immediately capable of detecting whether the other party understands as a result of their facial expression (Gorse and Emmitt, 2007). In face to face communication, information is sent and received almost at the same time in such a manner that the ability to resolve issues is increased substantially (Gorse and Emmitt, 2003).

2.9.2 Telephone

In the construction industry, time is always an important commodity. Indeed, time is a factor for measuring the performance of construction projects. In the past communication was difficult unless the construction/project manager or site supervisor is in transit. However, the introduction new cellular phones and other technology devices has changed that (Gann and Salter, 2000). The use of such advanced communication tool has contributed to sufficient time savings during project execution. Additional advantages of telephone communication is its information richness and the fact that the telephone is usable from anywhere on the site (Erdogan et al., 2012). The project manager is able to exchange information with the other participants at a faster rate. However, complex technical issues cannot be communicated effectively with telephone. The professional language gap between the construction manager and the other team members becomes difficult when they communicate between themselves through the telephone (Hancock et al., 2009). The use of telephones for communication have not only revolutionized the construction industry but have also changed the manner in which people interact, thereby reducing face to face communication (Denis et al., 2001).

2.9.3 Faxes

According to (Gorse and Emmitt, 2003) faxes are used to confirm details, provide instructions and correct details or instructions. They are fast and especially effective for communicating textural or information of graphical nature. Though the usage of faxes for information is quicker relative to other methods, an important problem is that the fax information is only delivered in A4 width (Gorse and Emmitt, 2003) and it cannot be edited (Ho and Stockmeyer, 2005). Though using fax to communicate is faster, it is rather difficult to update all other related project documents and distribute to relevant parties within the same time frame (Gorse and Emmitt, 2003).

2.9.4 E-Mails

Where a communication requires explanation, emails are a preferable choice (Walker et al., 2009). Emails also are useful for reporting, informing and transmitting project information to the participants. Mostly such information is sent as an attachment. Email messages can be delivered by to the receivers in different locations (Li et al., 2009). The use of emails has provided a means of rapid transfer of both textual and graphical information and has enhanced decision making and problem solving during the construction process (Powell et al., 2006). The sine qua non for the use of emails is access to the internet (Li et al., 2009). Gorse and Emmitt (2003) discovered that a major challenge is that most construction sites do not have internet access, and owing to the late adoption of information technology by the industry, most professionals are not experienced in the use of emails. But in recent times, the use of the emails has become easy due to its accessibility on desktop computers, laptops, ipads, tablets and smartphones (Joshi et al., 2014). Due to this, there is the likelihood of frequent use of mails than the other means of communication (Joshi et al., 2014). Scope of work and details of construction are communicated by means of drawings, contract documents, addenda and specifications (Maslej, 2006). Contracts are commonly issued when one entity passes down work to another: for example, when an owner hires a consultant or designer they form a contractual relationship by means of signed contract. Same is true when a consultant, on behalf of the owner, hires a general contractor to execute the work designed by the consultant. The contractor may wish to subcontract some of his work to subcontractors in which case, again a contractual relationship is formed. Unfortunately, miscommunication is a common occurrence in construction when work is passed down from one entity to another (Maslej, 2006). Furthermore, for ease of classification, the forms and methods of communication in the construction industry are outlined below (Borgatti et al., 2009);

- 1) Formal Writing – This takes the form of Project Plan, Project charter, Specifications, Reports, Metrics.
- 2) Formal Verbal – Presentation and speeches fall under this category
- 3) Informal Writing – Examples of informal written methods of communication include memos, e-mail, notes, etc.
- 4) Informal verbal - Meetings, stakeholders and conversations are categorized under informal verbal method.
- 5) Nonverbal Messages – These are conveyed through our facial expressions as well as our postures and gestures and account for about 55% of what is perceived and understood by others.
- 6) Para-verbal Messages – These include the tone, pitch, and pacing of our voice and account for about 38% of what is perceived and understood by others.

Effective communication is a two-way process which involves active listening and reflects the accountability of speaker and listener. It also utilizes feedback to confirm understanding which makes it free of stress.

A summary of the various methods employed in the construction industry and their respective merits and demerits have been provided by Walker et al. (2009) as follows:

Table 2.5: Shows Advantages and Disadvantages of the means of communication

Method	Use of Communication Method	Advantages	Disadvantages
Face to face	<ul style="list-style-type: none"> • To solve problems • To reflect on ideas • To transfer information • To negotiate 	<ul style="list-style-type: none"> • Ability to use all of the senses • Resolve problems before it is contractual. • May convince others of difference views before taking entrenched positions. 	<ul style="list-style-type: none"> • May stop ideas from developing prematurely • Misunderstandings are likely if each participants understands differently.
Correspondence	<ul style="list-style-type: none"> • To establish historical records and fulfil contractual obligations • To maintain control 	<ul style="list-style-type: none"> • Documents establish rights and obligations • Records of projects are kept 	<ul style="list-style-type: none"> • Slow • Gaps may exist between information required and information provided • Small pieces of information cannot be passed
Email	<ul style="list-style-type: none"> • options • Reporting on issues • Passing information 	<ul style="list-style-type: none"> • Provides a traceable “feel” • Instant • Documents can be attached for clarification 	<ul style="list-style-type: none"> • Is instant and may cause misunderstandings • May become “stuck” in response and counter response without resolution • Keeps people glued to their seats and not use other communication methods.

Telephone (mobile phone)	<ul style="list-style-type: none"> • Provides mobile communication 	<ul style="list-style-type: none"> • Ability to resolve ongoing problems immediately • May initiate resolution to problems on site 	<ul style="list-style-type: none"> • Limited to verbal understandings
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Source: Barakat (2009)

2.10 INTERPERSONAL COMMUNICATION IN CONSTRUCTION

There exist numerous studies that have paid attention to the lack of effective communication in the construction industry (Emerson, 1962, Erdogan et al., 2012). Communication carries a special importance within the industry as a result of its project-based structure. Given that construction is such a fragmented, dynamic and disparate sector, effective communication becomes essential “for the successful delivery of performance goals (productivity, profitability and repeat working opportunities” (Powell et al., 2006). A review of management literature reveals that studies on communication have focused mainly on the nature of interpersonal communication. However, there seems to be few empirical studies related to the subject in project-based industries such as construction. Interpersonal communication in construction projects takes three forms: oral, written (or graphic), and nonverbal communication. Oral communication refers to sending messages by using common spoken symbols. It includes face-to-face, telephone, meetings, and presentations. In a project environment, it is the appropriate medium for “timely exchange of information, rapid feedback, immediate synthesis of message, and timely closure” (Cho et al., 2011). Written communication includes e-mails, fax, memos, letters, reports, plans (strategic and tactical), legal documents and other forms of information to be transmitted. (Gorse and Emmitt, 2003) investigated interpersonal communication behavior between designers and contractors during the construction phase of projects. Their findings reveal that informal approaches such as face-to-face are perceived to be the most effective medium of communication within the industry. Their results are also supported by Krzymien et al. (2001) who conducted communication research within the Swedish construction industry. Krzymien et al. (2001) argue that “barriers to effective communication are likely to be broken down by more integrated project delivery systems. In their study, Shohet and Frydman (2003) identified effective patterns of communication at the construction manager level projects delivered by construction management procurement protocol in Israel. They found that verbal communication continues to be highly important in ensuring adherence to project objectives. Furthermore, Culp and Smith (2001) argue that personality type plays an important role in determining the success of interpersonal communication. Based on Myers-Briggs Type Indicator, they investigated the impact of personality in interpersonal communication. Although there has been substantial research in the area of interpersonal communication, little has been done on communication styles in construction industry settings. For this reason, this study focuses on the evaluation of the similarities and differences in communication styles of construction professionals.

2.11 COMMUNICATION MODELS IN CONSTRUCTION INDUSTRY

The communication models summarized in the Table 2.1 and Figures 2.2, 2.3, 2.4 and 2.5 below focuses on project environments. Many models dating from the late 1940s are referred to as transmission models since they approach communications as a means of information transfer problem based on some variation of four fundamental elements:

Sender (or Source) → Message → Channel (or Medium) → Receiver

One of the most popular models was created when Warren Weaver, a distinguished mathematician, applied Claude Shannon’s concept of information transmission loss over telephone wires to interpersonal communication. Shannon was a research scientist at Bell Telephone Laboratories trying to achieve maximum telephone line capacity with minimum distortion. Though he had never intended for his mathematical theory of signal transmission to be used for anything but telephones, the Weaver adaptations were very influential in information theory. Norbert Wiener, a renowned mathematician and founder of cybernetics, added the feedback loop to the Shannon-Weaver Model.

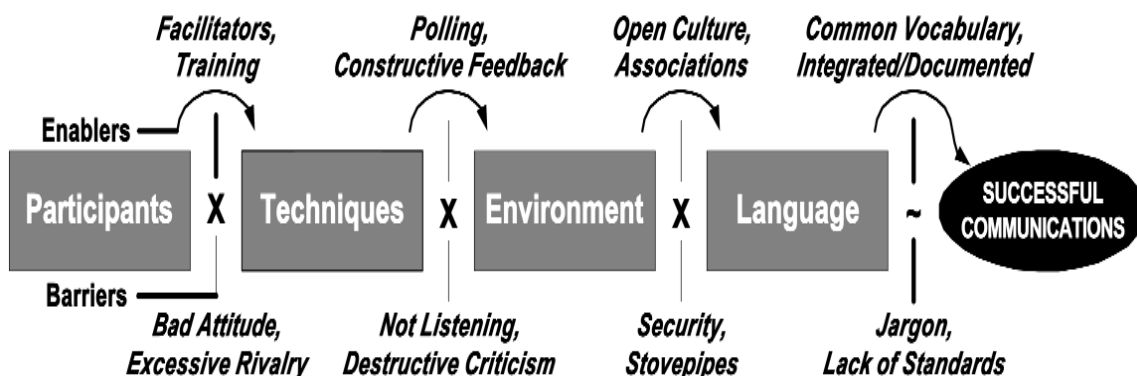


Figure 2.8: Shows

The project management communication model designed by Shannon-Weaver Model (Adopted from Mehra, 2009)

The Lasswell Formula (Figure 2.9), another popular transmission model introduced a year later by sociologist Harold Lasswell, added the idea of impact or effect. The transmission models have also influenced early studies of human communication, but many

theorists now consider them to be misleading. These models and their derivatives focus more on the study of message-making as a process, rather than on what a message means and on how it creates meaning.

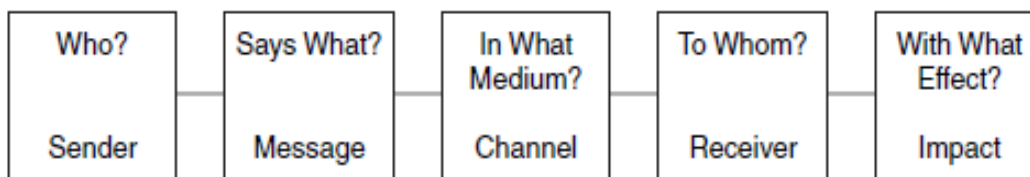


Figure 2.9: Shows The Lasswell Formula model for communication (Adopted from Mehra, 2009)

David Berlo, a well-known communication researcher who studied at the University of Illinois with Wilber Schramm, introduced the model in Figure 2.10 in 1960. Further emphasizing encoding and decoding, he defined five verbal communication skills: speaking and writing (encoding skills), listening and reading (decoding skills), and thought or reasoning (both encoding and decoding).

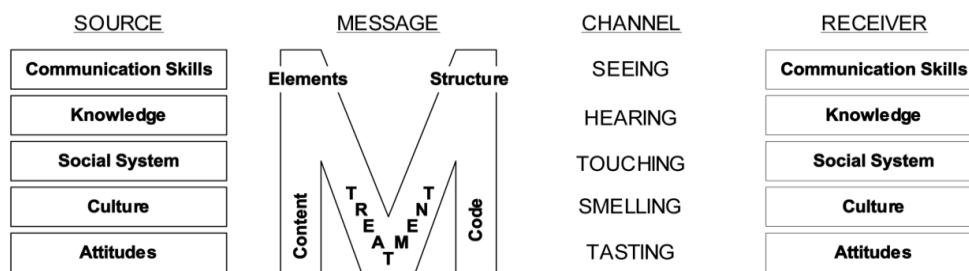


Figure 2.10: Shows David Berlo's SMCR Model (Adopted from Mehra, 2009)

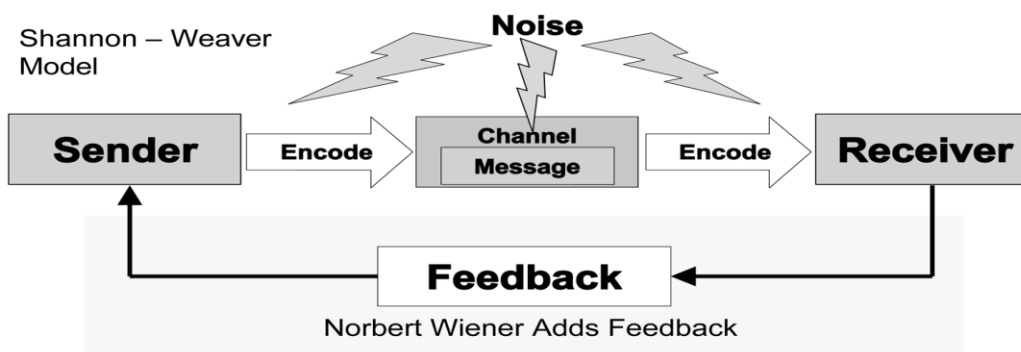


Figure 2.11: Shows Shannon-Weaver Model with Wiener's feedback (Adopted from Mehra, 2009)

Almost all the models described have a sender and receiver as well as encoding and decoding methods.

Sender – Is an information source, who initiates communication.

Encode – Information is encoded into a message. Sender should make sure that he truly provides understandable information to another project team member. This means that sender must attempt to take the perspective and knowledge of the receiver into consideration and create and present a message that he or she is likely to interpret in the way intended. Medium – Messages may be sent using traditional mail, email, phone call, face-to-face or using gestures alone. Medium is the communication method used to transmit the message.

Decode – Message is decoded to understand the information sent by sender. Sender uses his knowledge and understanding of the subject matter to decode this message, hence extra caution is required to interpret the message in right context (sender's context).

Receiver – The person to whom the information is sent.

Feedback – Receiver sends a feedback to sender to acknowledge that the information is received and understood. Sender may have to act further to ensure that the receiver understood the message by eliciting feedback that helps sender to assess whether receiver interpreted the message as intended.

Sender may use symbols, signs, behavior, speech, writing, or signals to transfer the information in the message. The purpose is to ensure that both parties understand the perspective (Borgatti et al., 2009). The project manager has a responsibility to examine communication needs stakeholder analysis and select appropriate communications medium and frequency for information distribution. The Communication Plan should determine how project documents will be organized and distributed. The documents include meeting minutes, status reports, customer requests, forecasts, and change status requests. The guidelines for distribution will be appropriately communicated to project team members.

Status Reports – reports that describe where the project stands at a specific point in time should follow the following organization:

I. Accomplishments for week or month

- ✓ Describe most important accomplishments. Relate them to project's Gantt chart.

- ✓ Describe other important accomplishments, one bullet for each. If any issues were resolved from the previous week or month, list them as accomplishments

II. Plans for following week or month:

- ✓ Describe most important items to accomplish in the next month. Again, relate them to project’s Gantt chart.
- ✓ Describe other important items to accomplish, one bullet for each.

III. Issues: Briefly list important issues that surfaced or are still important

IV. Project Changes (Dates and Description): List any approved or requested changes

to the project. Include the date of the change and a brief description.

Meeting Minutes – document used to convey purpose of meeting, items of importance, crucial decisions, and action items.

Request for Proposal (RFP) – document used to solicit proposals from prospective suppliers.

Request for Quotation – a document used to solicit quotes or bids from prospective suppliers. Change Status Request – oral or written acts or omissions by someone with actual or apparent authority that can be construed to have the same effect as a written change order.

Forecasts – used to predict future project status and progress based on past information and trends; especially project control and cost.

2.12 COMMUNICATIONS PLAN - MANAGING STAKEHOLDERS

The project manager must understand and build a working relationship with various stakeholders. They should specifically address how communication can satisfy the needs and expectations of the stakeholders. To assist with managing stakeholders and provide the project sponsor with guidelines to measure scope, time, and cost goals; an expectation management matrix will be created to clarify expectations. Another tool to help manage stakeholders and also resolve project issues is an issue log. The issue log will be kept on file by the project manager. The issue log will be electronic and a hard copy will be kept as a backup method. The log will include: Issue number, Issue Description, Impact on project, Date Reported, reported by (Who), Assigned to (Who handled the issue), Priority (H, M, L) High, Medium, Low, Due Date, Status (Open, Closed) and Additional Comments.

Issue #	Issue Description	Impact on Project	Date Reported	Reported By	Assigned to	Priority	Due Date	Status	Additional Comments
1	Two people left the project	Need to reassign personnel	04/20	March Yakubu	Project Manager	High	12/20	Open	If the project manager cannot reassign people ;then the PM should meet with team to search for replacement

Table 2.5: Shows A table showing an issue log (Adopted from Mehra, 2009)

Stakeholders should be notified of changes and progress on a weekly basis. A formal meeting will be held monthly to discuss progress, plans, scope, goals, budget concerns,

etc. Stakeholders will be able to access project manager or project sponsor via email and phone. Occasional email chats will be available to discuss issues. Email etiquette is enforced. If immediate attention is needed, the project manager or project sponsor should be notified immediately. Communication according to Maslej (2006) is said to be effective within the working group in the construction industry only when the transmitted ideas achieve their desired action or reaction, as the operations involve the team effort of the client, quantity surveyor, architect, consulting engineer, specialists and the contractor’s organization with the main objective of getting things done through human beings. According to Maslej (2006) noted that to better understand the concept of communication in the construction industry, it is important to acknowledge the roles, responsibilities and the authority of various participants on a typical construction project and how information gets exchanged.

2.16 PROBLEMS / BARRIERS OF PROJECT COMMUNICATION

Communication problems encountered in a construction project are considered to be critical especially when time is wasted and is accompanied by cost leading to reworks (Gorse and Emmitt, 2003). Communication problems or barriers are the elements or factors that hinders or distorts information from being sent or received (Mailabari, 2008). Given the complexity of the task of communication, it is easy to accept that challenges may be present (Bertrand et al., 2002). This could be due to the fragmented nature of the construction site and the number of participants involved. Since these parties represent different professions, these multidisciplinary skills limit the extent of their cooperation (Cheng et al., 2002). Communication problems are easily detected in an organizational environment, where information centralization problems and issues of different interpretations are present (Carvalho et al., 2013). There are several communication challenges that are faced by the construction manager, who communicates with an array of people on the construction site (Knödseder et al., 2005). These however are not unsurmountable and the successful construction manager will recognize and develop strategies to overcome them (Gillard, 2005). The lack of accuracy in communication is a communication problem that arise on daily basis (Carvalho et al., 2013). Critical communication problems that construction managers must overcome include the management of the individuals and groups who may be having different degrees

of technical expertise (Knödlseeder et al., 2005). Communicating with onsite employees have become difficult due to the extent of work site change, information overload and the diversity of the work force (Fama and French, 2002). The construction manager can also become a barrier to the workers because of their power and influence on what employees sees and hears (Gillard and Johansen, 2004).

These variables are explained below:

2.16.1 Information Underload

Where the information required is not available, or not enough, the problem of information underload emerges (Li et al., 2009). The problem of information underload can stifle timely decision making (Llave et al., 2002).

2.16.2 Information overload

Overload occurs when there is more information at the disposal of an individual than they can utilize it. Information overload can lead to a breakdown where the receiver cannot send feedback to the sender (Llave et al., 2002, Maslej, 2006).

2.16.3 Distortion

Distortion in information communication implies that the information sent or received is changed in meaning or some of its content is lost during dissemination (Murray, et al., 2000). Xie (2002), also agreed with this assertion stated that when the content of an information is changed during transformation, distortion is present. Distortion normally occurs during the transmission of information and the longer the chain of transmission the greater the distortion (Dainty et al., 2006; Cheung et al., 2013).

2.16.4 Gatekeeping

Gatekeeping is when an individual intentionally or unconsciously withholds an information from others (Mead, 1999). The problem of gatekeeping can frequently occur on construction sites where the chain of communication is long. Liu (2009) in his study found that the problem of gatekeeping is prevalent in Beijing building projects.

2.16.5 Barriers

This is the presence of barriers that makes communication difficult. This can be interpersonal, logistical, accessibility among others (Xie, 2002). Liu (2009) stated that information inaccessibility was caused by poor presentation or hierarchical barriers. According to Thomas et al., (1998), language is the most critical barrier to effective communication.

2.16.6 Misunderstanding

Misunderstanding occurs when there is a misunderstanding of the expectation (sender) and the requirement between the parties (Liu, 2009). Xie et al. (2000) indicated that misunderstanding was a major problem in multi-team design processes.

2.16.7 Inaccuracy

The problem of inaccuracy according to Liu (2009) includes aspects of conflicting instructions and poor communication. This problem is also often caused by lack of coordination (Xie et al., 2000).

2.16.8 Untimeliness

Untimeliness occurs when information regarding changes are not delivered on time (Liu, 2009). Communication is only effective when information is provided in its right format, and at the right time (Project Management Institute, 2008). Xie et al. (2000) indicated the causes of information delay includes administration, information distribution, information prioritization, communication channel, communication line, organization structure, and the knowledge about the period of information flow. Other earlier researchers have also identified some communication problems that are encountered on construction projects. Mehta (2002) highlighted some communication problems to include information overload, hidden agendas, power games, bias towards certain people. Mailabari (2008) also stated differing perception, poor listening and premature evaluation, distrust, badly expressed messages, difference in background, information overload, inconsistent verbal and non-verbal communication, emotional evaluation, and noise/distraction as the communication problems that are encountered in construction projects.

2.17 THE GHANAIAN CONSTRUCTION INDUSTRY

Typically, a construction industry of any country could be seen as having two main sets of features which make it unique from all others. The first one is the peculiarity of the construction industry which distinguishes it from other industries. The second being the peculiarities of each country's construction industry as defined by its socio-economic level, technological level, culture, institutional and legal frameworks. The first one has been generally addressed in the preceding sections. This section, therefore, focused on the second aspect. It discusses the set-up of the industry, its project execution situations and how efforts are required at improving performance through systematic measurement and management. The key stakeholders in the construction industry in Ghana are clients, professional consultants and contractors. The upper classes of D1 and D2 are considered as more organized and are noted for executing large scale projects. The financial threshold to which these contractors can bid are illustrated in Table 2.1 construction projects in Ghana with high contract sums are mostly awarded to contractors in the D1 and D2 categories. In most cases, these projects are undertaken through partnerships and sub-contracting. By sub-contracting, many unique type of contractor organizations who specialize in specific areas of the project are hired to build according to a set of plans and specifications (Aiyewalehinmi, 2013). The contractual arrangements provide for the establishment of lines of communication, responsibility for the provision of information and pattern of co-ordination within the parties among the organizations (Murray et al., 2000). The aggregation of many organizations on a particular project site comes with its associated characteristics of the presence of several construction operatives. And as stated by Abugre (2013), it is effective communication between the workers that gives life to the organizational structure and hence the successful execution of the project. It is against this background that this study seeks to develop a framework to help in planning communication to help construction managers coordinate site operatives.

Table 2.6 Financial Thresholds of Contractors

Financial Class	Building Contractor Designation	Financial Limits of Projects
1	D1	-
2	D2	US \$ 500,000
3	D3	US \$ 200,000
4	D4	US \$ 75,000

2.17.2 The Client

In Ghana four main clients are distinguishable: the Government (being the major client), Real Estate Developers, Investors and Owner occupiers. Between 2000 and 2008 the government of Ghana identified construction as a priority sector for foreign and private investment as part of its vision to promote the private sector as the engine of growth. According to World Bank (2003) as provided by Anvuur and Kumaraswamy (2006), an approximate annual value of public procurement for goods, works and consultant services amount to US\$600 million. This represent about 10% of the country's GDP. This amount forms part of the bulk of the expenditure of all government agencies, namely, the Ministries, the Assemblies, Departments, Institutions and other Agencies. Procurement of contracts must strictly follow the rules and regulation of the Public procurement law as stipulated in the Procurement Act, 2003 (Act 663). The main procurement arrangement is the traditional competitive bidding. The government as a client is represented by the Ministry of Road and Transport (for road works) and the Ministry of Water Resources, Works and Housing in giving out projects. The Real Estate developers are also the other group of clients who undertake large investment in building. Usually, these take loans and undertake speculative buildings for sale. Their performance is usually influenced by the lending situations in the country. An interview with the head of the Ghana Real Estate Developers Association (GREDA) in 2007 revealed that they expect extra assistance from the government to support them in their quest to contribute to solving the housing problem in the country. In particular, they expected the government to have involved their association in its on-going affordable housing program. Investors are usually financial companies who decide to invest excess capital in building construction. The Social Security and National Insurance Trust (SSNIT) is one of the leading investor in housing in Ghana. Owner occupiers are individuals who decide to build their houses to live in. It has been the tradition of Ghanaians to buy lands from the chiefs (the chiefs are the custodians and owners of land in Ghana, not the government) and hire skilled and unskilled workers to build their houses for them. This tradition has been entrenched mostly because successive governments failed to meet the housing expectations of individuals. Some of these owner occupiers also rent out extra rooms in their houses for income. Therefore, some of these owner occupiers are able to progress to the level of being private investors. The owner occupiers, thus, constitute the largest number of clients in Ghana –almost every Ghanaian is a potential owner occupier. They usually, do not engage professional consultants.

2.17.3 Professional Consultants

Professional consultants who are regularly engaged by the government and other clients are Architects, Quantity Surveyors (QS), Geodetic Engineers (GE), Structural Engineers (St.E), Electrical Engineers (EE) and Services Engineers (SE). Geodetic Engineers are often involved in roads construction. All these professional are regulated by their professional institution, namely, Ghana Institute of Architects (GhIE), Ghana Institute of Surveyors (GhIS) for the QS and GE and (GhIE) Ghana Institute of Engineers for the rest respectively.

2.17.4 Project Contractors

Contractors in Ghana are grouped into eight categories (A, B, C, S, D, K, E and G) according the type of works they undertake. These are:

- (i) Roads, Airports, and Related Structures (A)
- (ii) Bridges, Culverts and other Structures (B)
- (iii) Labor based road works (C)
- (iv) Steel bridges and structures: construction rehabilitation and maintenance (S)
- (v) General building works (D)
- (vi) General civil works (K)
- (vii) Electrical works (E)
- (viii) Plumbing works (G).

In each category, they are grouped into 4, 3, 2 and 1 financial classes in increasing order (Vulink, 2004). In addition, Dansoh (2005) notes a combined category of AB for road contractors. According to Dansoh (2005) Class 4 contractors can tender for contracts up to \$75,000; class 3 up to \$200,000; class 2 up to \$500,000. Class 1 take contracts of all amounts. The research focused on projects undertaken by category D and K contractors, together with categories E and G being usually engaged as sub-contractors to this main contractor for general building works. Categories E and G contractors act as main contractors when the work is of a specialized nature. The industry is dominated by large number of small- and medium-sized firms, that is, classes 3 and 4, especially in the categories D groups, E and G. This is mainly because such firms are able to register with as little equipment as possible. Mostly, they are sole proprietors, (few cases of partnerships) and are characterized by high attrition rate. This is because they are highly

influenced by the boom and slum nature of the industry in Ghana. They are the least organized and because they lack the resources to employ and retain very skilled labor, their performance is usually below expectation and they have often been accused of producing “shoddy” works. This is because there are often more jobs within their financial class than those above their limits and because they form the largest group, their performance impacts greatly on the performance of the industry. Due to this, the classification by the Ministry has been criticized as being too general and obsolete with the registration criteria, list of contractors and monetary thresholds not regularly updated (Eyiah and Cook, 2003; However, these firms (especially the D2 firms) do not always employ the very qualified workers. The Ghanaian-based foreign contractors are able to do this and hence performed better. Vulink (2004) notes that because of the poor performance of Ghanaian local contractors most of the nation’s major projects are usually awarded to foreign contractors. Assibey-Mensah (2008) attributes this to the “nonbusiness like culture” with which indigenous firms operate in Ghana.

2.17.5 Construction Projects and Procurement

Following the procurement law, construction activities in Ghana (government projects) are organized essentially as a tripartite arrangement between the client, professional consultants and the contractor. The clients, upon taken a decision to build, calls on the chief consultant, usually, the Architect and the other consultants. They provide professional advice to the government during the briefing stage. They then provide design, appoint the qualified contractor, supervise the execution and advice for payment and finally, conclude the project. The table below describes the usual process of project procurement in Ghana using the traditional system.

Table 2.7 Procuring a Public Construction Project in Ghana

Stakeholder	First Action	Second Action	Third Action	Fourth Action	Fifth Action
Client	Conceptualize	Initialize	* * * * *	* * * * *	Use the product
Practitioners (Consultants)	* * * * *	Design Client’s concepts	Manage the project	Manage the project	* * * * *
Contractor	* * * * *	* * * * *	Execute the project	Complete the project	* * * * *

(Adopted from World Bank, 2003)

*Stakeholder has no active role.

This has meant that after the initial stage, the client’s role is often limited to expecting the finished product. The consultants, led by their team leader (usually, the Architect, Quantity Surveyor or Civil Engineer depending on the project, or project manager where applicable) traditionally become not only the managers of the project ensuring that the right thing is done by the contractor but also the sole judge assessing and giving the verdict as to the state of performance and satisfaction of the project to the client. In reviewing, Anvuur and Kumaraswamy (2006), the performance of the construction industry in Ghana is poor and saddled with several problems ranging from contract administration, through complex and lengthy payment procedure, delayed payments to that of project execution. It is noteworthy that clients’ delay in payment to service providers (contractor and practitioners) also affects payments of salaries and wages of their staff. This is because sometimes these delays run into several months and thus, these employers find it difficult to continue paying their staff. The unskilled labors of the contractors form the largest group and the lack of guaranteed income, despite their commitment to work, shows an unpleasant side of the industry that is seen as one of the largest employer of labor. Due to the representation of construction workers in the working population of the country, such situation reflects on the socio-economic life of ordinary Ghanaians. The reverse is also true. This could be likened to a period of freeze on government projects. To some extent, in Ghana, there are practical reasons to subscribe to the argument that construction industry is a regulator of the economy Ashworth (2004).

2.18 CONSTRUCTION INFORMATION REQUIREMENTS

Construction relies primarily on the generation of large amounts of information, its transmission, interpretation, maintenance, reuse and eventual recycling (Barakat, 2009). In developing a framework that can enhance construction communication requires an identification and categorization of on-site information needs (Chen and Kamara, 2008b). From the start of the project through construction to the end, ideas are developed, decisions are made and several information are generated and shared among the participants of the project (Chin, 2008). During the Pre-Project phase, majority of information is communicated between the owner or owner’s representatives, Contractor’s Project Manager and the design team (Ballan and El-Diraby, 2011). This pattern of communication changes during the construction stage where majority of exchange of information are between Construction Manager, Site Superintendents, Foreman and design consultants. Depending on the nature of the organization, most communication during the construction phase are handled by the construction manager. On the construction site, the construction manager with the help of other site engineers produces several reports which are disseminated to the various departments of concern (Gyampoh-Vidogah et al., 2003). Several site personnel require large volume of information that ranges from design drawings to personal diaries to enhance decision making (Chen and Kamara, 2008b). Control of the information generated depends to a larger extent on the one who has created the information. This can range from the architect to the client or to the contractor (Craig and Sommerville, 2006). Garcia Garcia et al. (2014) argued that low productivity on construction projects can be attributed partly to the fact that the information needs during construction are not adequately met.

The Project Management Institute (2008), indicated that in planning communication, it is important to first identify the information needs and the methods of distribution of these information. Construction site information needs have been categorized by several research studies. For instance, Chen and Kamara, (2008) grouped site information needs into 12 groups which includes drawings, material, Equipment, Contract, progress, safety, sub-contractor, design clarifications, construction method, specification, labor, and quality. Nourbakhsh et al. (2012) cited De La Garza also grouped construction information into 10 groups which are requests for information, material management, equipment management, cost management, schedule means and methods, jobsite record keeping, submittals, safety, quality control/ quality assurance, and future trends. Ballan and El-Diraby (2011) further provided various categories of information based on the study of De La Garza and into several sub-categories and are shown in the table below:

Table 2.8: Shows Construction Information needs and requirements

Category	Information Needs and Requirements
Request for information	Design Intent and Clarification Change Orders / Contemplated Change Domestic Sub-Contractor Information Nominated Sub-Contractor Information Contract Specifications Contract Drawings Means and Methods Site Instructions
Materials Management	Place Request/Order Material Access to material management Material Order Status Material Location Special Material Handling/Delivery
Equipment Management	Equipment Rentals Equipment Allocation Hiring firm information
Cost Management	Budget Pricing Field Labor Costs/ labor Sheets Material Cost Accounting Purchase Orders and Extras
Site, Schedule and Construction Information	Schedules Updates Subcontract Performance Reports Update Drawings and As-Builds Labor Time Sheets Progress Reports Visitor Log Daily Site Diary
Quality Control/ Quality Assurance Management	Quality Assurance/ Control Reports Soil reports / Inspection and Test Results
Safety	Accidents Reports Reporting Safety Violations Safety meetings Sub-Contractor Health and Safety Packages

Source: Modified from Ballan and El-Diraby (2011)

3.0 RESEARCH METHODOLOGY

3.1 INTRODUCTION

The previous chapter reviewed literature and set the pace for the development of a survey from which the opinion of respondents was sought. This chapter encompasses the research design adopted for this study. According to Kothari (2004), stated that research design provides the conceptual structure for the research study and it constitutes the blueprint for the collection, measurement and analysis of data. As such this chapter details the philosophical standpoint of the study, the research design, the data collection methods and methods of data analysis.

3.2 PHILOSOPHICAL STANDPOINT OF THE STUDY

Saunders et al. (2009) intimated that the philosophical viewpoint of a research study relates to the development of knowledge and the nature of that knowledge. Indeed, it has been argued that research should not be preceded by methodology but rather the choice of methodology should be dictated by the philosophical consideration of the research (Holden and Lynch, 2004). Thus, it is imprudent to conduct a study without a consideration of the philosophical assumptions for the study (Pathirage et al., 2005). It is therefore important to define the philosophies that underpin a research study in order that the appropriate methodology is adopted. Research philosophy explains the epistemological, ontological and axiological assumptions upon which research is undertaken (Pathirage et al., 2008). Epistemology is concerned with how knowledge can be created, acquired and communicated, thus what it

means to know (Scotland, 2012). It makes the claim of what is acceptable and valid knowledge thereby cutting research into what is acceptable and unacceptable (Tennis, 2008). Epistemology is related to the ontology and methodology philosophies. Whereas ontology involves the philosophy of reality, epistemology provides how the reality can be known while methodology identifies itself with the practices that can be used to attain knowledge of the reality (Krauss, relationship between what is known and the enquirer? How do we know what we know? (ibid.). According to Saunders et al. (2009), positivism and interpretivism are the two main epistemological considerations in research. According to Krauss (2005), in the positivist paradigm, the researcher is independent of the object being studied. The discovery of knowledge is achieved by either direct observation or the measurement of phenomena. In the positivism philosophy, only phenomena that can be observed can lead to the production of credible data and the research strategy adopted for data collection of these data is most likely existing theory to develop hypothesis (Saunders et al., 2009). The emphasis of positivism is that genuine, real and factual occurrences can be studied and observed scientifically and empirically and could also be expounded by comprehensive and rational investigation and subsequent analysis (Aliyu et al., 2014). Another essential feature of the positivist position is that the research is undertaken in value-free way (Saunders et al., 2009). Thus, the decision of what to study, and how to study it can be determined by an objective criterion instead of human beliefs and interests (Holden and Lynch, 2004). The interpretivist position of research is that phenomenon is based on the interpretation of peoples' conviction (Walliman, 2003) cited in (Ahadzie, 2007). It is one of subjectivism which is based on the real world phenomena (Scotland, 2012). Thus, meaning is not there to be discovered; it is constructed via the interaction between consciousness and the real world. In interpretive research the enquirer has to be part of the research process (Ahadzie, 2007). Perhaps the position of the interpretivist is made clearer in the statement made by Scotland, (2012) saying that 'A tree is not a tree without someone to call it a tree'. Interpretive methods provide insight into understanding behavior and explains actions from the perspective of the participant (Scotland, 2012). Thus human interest is largely the dominating driver of the science (Ahadzie, 2007). This study seeks to develop a framework for communication on site. It resorted to collecting data from sites to help draw conclusions. In effect the researcher sought to 'discover' how communication is done onsite and develop this into an integrated framework for construction managers. This line of action follows the positivist epistemological philosophy and was thus adopted.

Ontology is concerned with the nature of reality (Saunders et al., 2009). It explains 'what' knowledge is and the underlying assumptions about reality (Pathirage et al., 2008). Whereas ontology is concerned with the understanding of 'what is' epistemology is concerned with the understanding of 'what it means to know' (Gray, 2014). Objectivism and Subjectivism are the two aspects of ontology according to Saunders et al. (2009). The objectivist posits that reality exist external to the social actors whereas the subjectivist posits that social phenomena are created from the actions and perceptions of the social actors (Ibid.). From the foregoing, it can be deduced that the objectivists view leans towards the positivist philosophy whereas the subjectivist view leans towards the interpretivist philosophy. At the ontological level, the objectivist philosophy was adopted. This is because the practices of communication on construction sites are real and not borne from the construction of the researcher. Axiology is that component of research philosophy that studies judgement about values (Saunders et al., 2009). Axiology classifies the reality into value free and value laden (Pathirage et al., 2008). When the research is value neutral, the choice of what to study and how to study is determined by an objective criterion whereas value laden research is determined by human beliefs and experience (Easterby-Smith et al., 2002). The Study selected the Value free axiological philosophy position since the study was determined by an objective position. Again, the value free axiological philosophy is accommodated within the epistemological positivist and the ontological objectivist philosophies already advanced and selected for the study (see Figure 3.1).

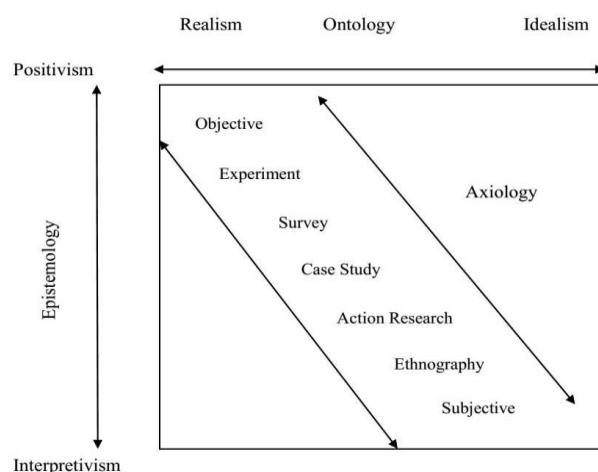


Figure 3.1: Research Philosophical Assumptions Source: Pathirage et al. (2005)

3.3 RESEARCH APPROACH

According to Fellows and Liu, (2008) opined that in determining a research approach for a study, the critical contemplation is the logic that provides the links for the collection and analysis of data to produce results and the subsequent conclusion to the question being investigated. Approaches to research have multiplied and given researchers (Pathirage et al., 2005) the flexibility of choices (Creswell, 2003). Creswell, (2003) suggested the approaches of research to include quantitative, qualitative and Mixed Methods. The over-arching principle in quantitative research is the collection of numerical data and carrying out analysis that is dominated

by mathematically-based methods (Sukamolson, 2010). The ultimate aim is to classify features, count them and construct models that explains the phenomena observed (McCusker and Gunaydin, 2015). Studies that adopt the quantitative approach are well structured and have gained credibility for its validity and reliability (Kumar, 2011). The use of quantitative research for a study begins with data collection premised on theory or hypothesis and is followed with the application of descriptive or inferential statistics methods (Rajasekar et al., 2013). The aim is to infer a characteristic or establish relationship between the variables to a parent population (Brannen, 2005). Statistics dominates the analysis of quantitative data. This fact is evident in the characteristics of the quantitative approach (Rajasekar et al., 2013):

- ✓ It is numerical, non-descriptive, applies statistics or mathematics and uses numbers.
- ✓ The process is iterative where evidence is evaluated.
- ✓ Tables and graphs are often used to display the results.
- ✓ It is conclusive.
- ✓ It seeks to investigate the what, where and when of decision making.

The qualitative approach on the other hand is concerned with providing explanations of social phenomena (Hancock et al., 2007). It seeks to obtain the understanding of people about how they perceive 'the world' either as groups or individuals (Fellows and Liu, 2008). It focuses on understanding, explaining, exploring, discovering and clarifying situations, feelings, perceptions, beliefs and experiences of the group of people being studied (Kumar, 2011). Qualitative research is a function of the researcher's insights and impressions. The result generated from qualitative studies are non-quantitative and therefore not subjected to analyses that are quantitatively based (Kothari, 2004). Effective qualitative studies are characterized by correspondence between the perspectives that occasioned the research questions and the research methods used (Fossey et al., 2002). The mixed method approach combines the relative strengths of both quantitative and qualitative research. Adopting this method helps in reducing or eliminating the flaws of each qualitative and quantitative research whilst achieving the advantages of both methods and obtaining a multidimensional view of the subject (D'Angelo et al., 2008)(Fellows and Liu, 2008). The mixed method can provide pragmatic advantages when addressing complex research questions (McCusker and Gunaydin, 2015). The use of the mixed approach has been identified as a means of validating the claims or outcome of an initial study (Thompson et al., 2004). This study seeks to develop a framework for communication by gathering information on how construction managers communicate with their operatives on project site. The quantitative approach has been adopted for the study against the background advanced.

3.4 RESEARCH INSTRUMENT

The research instruments refer to the tools used for the collection of data during a study. A range of data collection tools include questionnaires, interviews, observations and the combination of these. The data collection method used for this study was the questionnaire. The questionnaire is the convenient tool often favored for data collection for its ability to provide cheap and effective data collection in a manner that is structured and manageable (Wilkinson and Birmingham, 2003). The most significant point when designing a questionnaire is to ensure that it is valid, reliable and unbiased (Zohrabi, 2013). The questions posed may be structured or unstructured. Structured questions provide answers from which the respondents are asked to select while unstructured questions require respondents to provide responses in their own words (Bhattacharjee, 2012). The questions adopted in this research study were broadly structured. Respondents were requested to tick answers from the options provided. The questionnaires were structured into four sections with each section addressing the objectives put forward for the study, save the first section that gathered demographic variables. The sections include, respondent background (section A), means of on-site project communication (section B), project communication barriers (section C), key channels of project communication (section D). For the medium of communication, respondents were asked to provide scores for their frequency of usage and their respective effectiveness. For each problem of communication, respondents were requested to score on a Likert scale of 1 -5, the frequency of occurrence where 1 = 'Not Often', 2 = 'Less Often', 3 = 'Moderately often', 4 = 'Often', 5 = 'Very Often'.

3.5 RESEARCH STRATEGY

A quantitative strategy was adopted for this study. Quantitative research follows a deductive approach in relation to theory and is often concerned with design measurement and sampling (Naoum, 2002). The quantitative research strategy employs the use of statistical techniques to identify facts and a cause-effect relationship between variables. According to (Nobles and Baladi, 2002)Naoum (2002), quantitative research is objective in nature and based on testing a hypothesis or theory composed of variables. Nobles and Baladi (2002) characterized the common data collection techniques used in quantitative research as questionnaires, tests and existing databases. Hard and reliable data are often collected in quantitative research and, therefore, emphasizes on quantification. The samples collected are often large and representative. It also makes it possible for the results of the study to be generalized to a larger population within acceptable error limits. The question which this research sorts to discover was how professionals working on a constructional project communicate.

3.6 RESEARCH DESIGN AND ITS JUSTIFICATION

Researchers collect evidence when they ask for someone's opinion. Attempts are subsequently made to determine the dominant view within a particular group. A survey study design was deemed appropriate for this study based on three reasons:

- ✓ Survey designs involved data collection from a group, generalizing the result of study to predict the attitude of the population of interest;
- ✓ The survey questionnaire may be structured to elicit information from the population of interest in a systematic and unbiased manner; and

- ✓ They permit statistical analysis of data and generalization to a larger population, which makes them suitable to construction management research.
- ✓

3.7 SAMPLE DESIGN PROCESS

The purpose of sample is to gain information about the population by observing only a small proportion that is the sample size. This study intended to understand how project professionals communicate on construction project in Ghana. As a result, the study's focus was on the professionals who work with the various project organizations in Ghana such as Contractors, Consultants, Surveyors, Civil Engineers, Architects, among others.

3.8 POPULATION DEFINITION

For the purpose of the study, the selection of professionals (respondents) was limited only to Project Consultancy Firms and or Agencies as well as D1K1 and A1B1 Contractors representing Building Contractors and Road Contractors respectively. Construction professionals comprised of Quantity Surveyors, Civil Engineers, Structural Engineers, Project Managers and Architects. The choice of this class of building contractors was made on the basis that they were well established firms which engage the services of these professionals. Consultancy Firms included public institutions like the Ministries, Departments and Agencies responsible for infrastructural project. The decision to focus on Greater Accra region was based on the list obtained from the Associations of both building and road contractors which showed that more than 65% of D1 KI and A1 B1 contractors have their presence in Accra. In addition, the limited time available for the study and financial constraints did not allow the researcher to travel to the other regions.

3.9 SAMPLING TECHNIQUES

The non-probability sampling technique was used in this study. In probability sampling, the decision as to whether a particular element is included in the sample or not, is governed by chance alone. The technique allows each individual to be chosen randomly by chance. Purposive sampling which is an example of the non-probability sampling technique was used in identifying the key respondents who were professionals in these project organizations; Contractors, Agencies and Consultants. This was because the researcher required certain categories of respondents who had been involved in a lot of construction projects and therefore had more experience with communication on constructional project to answer the questionnaires. Snowball sampling technique, which is an example of a non - probability technique was also used to get the number of clients for the study due to the different types of professionals who are working with project clients such as the Ministries, Departments, Agencies, Municipal, District Assemblies and Financial institutions. This sample technique was initially used to contact few potential respondents who are then asked to give names of persons or organizations with the characteristics sought for so that the sample size will be reduced with less costs. As a result of this, the professionals working with the D1 contractors and the consultants gave the names of clients they deal with. The list obtained from them was sorted out and the names of thirty (30) professionals working with project clients were obtained and targeted for the research.

3.10.1 The Sample Size Used

For this study the first and the later were applied. The total number of contractors with A1B1 and D1K1 status working in Accra area is 65 and according to their associations (Building and Road Contractors); each employs a minimum of three project professionals. Therefore, the population of the professionals working with these construction companies in Accra is one hundred and ninety-five (195).

$$n = \frac{n^1}{1 + \frac{n^1}{N}}$$

Where n = sample size

$$n^1 = \frac{s^2}{v^2}, s^2 = p(1 - p)$$

N = Total population = 195

s = Maximum standard deviation in the population elements

p = proportion of the population elements that belong to the defined category

i.e. p = 0.5 (95% confidence level)

v = standard error of the sampling distribution i.e. v= 0.05

Hence solving for n^1

$$s^2 = p(1 - p) = 0.5(0.5) = 0.25$$

$$v^2 = (0.05)^2 = 0.0025$$

$$n^1 = \frac{s^2}{v^2}, n^1 = \frac{0.25}{0.0025} = 100$$

$$n = \frac{n^1}{1 + \frac{n^1}{N}}$$

$$n = 100 / (1 + 100/195),$$

$$n = 66$$

The sample size formulae like the one used above, provides the minimum number of responses to be obtained. From previous works done, researchers such add 10% to the sample size to compensate for persons the researcher is unable to contact. Therefore, approximately, 7 which represent 10% of 66 would be added to the sample size. Thus a total of seventy-three (73) questionnaires were personally sent to professionals who work at the contractor’s offices in Accra. This is because the population of construction professionals working in the consultancy firms as well as government agencies were difficult to come by, a sample sizes (n) for the professionals working with clients and consultancy firms in Accra targeted for this study was 30 each. This was purely considered in the remits of convenient sampling method. The total sample size used for this research was one hundred and thirty-three (133).

3.11 DATA COLLECTION

Based on the objectives and the research questions, a questionnaire was developed to obtain an extensive, as practicable, from these project professionals. A questionnaire was therefore prepared and self-administered to the various respondents. The questionnaire consisted of closed ended questions. For the purpose of the study, the questions were grouped under three categories. The first series of questions related to respondent’s profile. This was intended to find out the background and experience of respondents. The second group of questions related to the communication in the construction project industries. A 5-point ranking system and a three-level scale of low, moderate, and high were utilized where the respondents were asked to indicate from the list of how communication is achieved currently on site, how important each is and how frequent those occurs.

3.12 METHOD OF ANALYSIS

Data analysis tool SPSS 20 for windows was used to analyze the data acquired. Frequency tables, tabulations and cross tabulations were done with results presentation in the chapter four below.

4. 0 FINDINGS, DATA ANALYSIS AND DISCUSSION OF RESULTS

This chapter is dedicated to the analysis of the data obtained from the field. The first section describes information obtained on the respondents that gives credibility to the study. The second section provides information on the data analysis with respect to the objectives set for the study.

4.1 SURVEY RESULTS

Table 4.1 represent professionals and others

Organizations of project professionals belongs to	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Client's Organization	49	36.8	36.8	36.8
Contracting firm	33	24.8	24.8	61.7
Consulting firm	43	32.3	32.3	94.0
Other	8	6.0	6.0	100.0
Total	133	100.0	100.0	

Questionnaires were sent to 133 persons, consisting of clients, consultants, contractors and others of which 125 responses were received for a response rate of 94%. The responses were further analyzed to determine the profile of respondents, the respondents’ position; whether respondents were familiar with the term project communication or construction communication.

4.2 DEMOGRAPHIC VARIABLES

Which of the following describes your position

Table 4.2 (a) shows the various positions held by construction projects on site

Positions of Project Professionals on construction site	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Quantity Surveyor	26	19.5	19.5	19.5
Project Manager	30	22.6	22.6	42.1
Architect	13	9.8	9.8	51.9
Principal Consultant	24	18.0	18.0	69.9
Managing Director	19	14.3	14.3	84.2
Contractor	15	11.3	11.3	95.5
Others	6	4.5	4.5	100.0
Total	133	100.0	100.0	

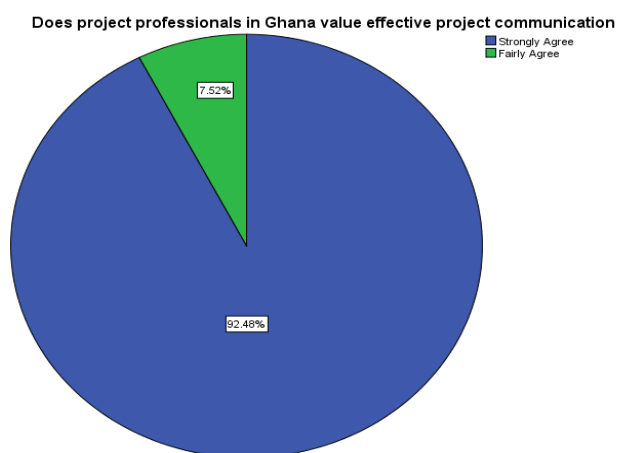
The demographic variables are presented in the table 4.3 below. The survey as presented in the Table 4.2 shows that 19.5% of the questionnaires were filled by Quantity surveyors, 22.6% by Project Managers, 9.8% by Architects, 18.0% by Principal Consultants, 14.3% by Managing Directors, 11.3% by the Main Contractors and 4.5% by Others (Project Engineers, Clerk of works). In table

4.2 above shows that the construction project professionals responses indicate that they are familiar with the concept of project communication on construction site.

Table 4.2 (b) shows how many years of experience do construction project professions have in the construction industry

Number of years of construction project professions possesses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Less than 5 years	40	30.1	30.1	30.1
5 years to 10 years	35	26.3	26.3	56.4
10 years to 15 years	10	7.5	7.5	63.9
16 years and above	48	36.1	36.1	100.0
Total	133	100.0	100.0	

From table 4.2 (b) shows of the respondents had construction industry. It experience of the practical and convincing 94.0% of all the project communication or



that an overwhelming majority of 36.1% more than 16-years of experience in the was necessary to find out the working respondents so as to be able to obtain answers to the questions asked. Overall, respondents were familiar with the term construction communication.

Table 4.2 (c) indicates whether respondents ever had any form of communication on construction projects

Respondents responses with regards to any form of project communication	Frequency	Percent (%)	Valid Percent	Cumulative Percent
Valid YES	129	97.0	97.0	97.0
NO	4	3.0	3.0	100.0
Total	133	100.0	100.0	

From table 4.2 (c) it shows that about 97% of clients responded that they ever had some form of project communication while only 3% shows that they have no experience on it. The overall experience of project professionals shows that 97% of their responses indicates that project communication is important on construction site.

Table 4.2 (d) shows the success of every construction project depends on effective communication

Project Professional Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid Strongly Agree	124	93.2	93.2	93.2
Strongly Disagree	9	6.8	6.8	100.0
Total	133	100.0	100.0	

The success of every project construction depends on effective project communication, which actually represent 93% of respondents from table 4.2 (d) strongly agree that effective project communication is essential to successful construction project completion.

Figure 4.2 is a Pie Chart showing how Ghanaian project professionals value effective project communication in the construction industry.

Source: Fieldwork, 2020

Figure 4.2 indicates that about 92.5% of Ghanaian construction project professionals strongly agree that effective project communication within the construction industry is very critical to the successfully completion of projects while only 7.5% fairly agreed to that assertion.

4.3 CHANNELS AND MEANS OF PROJECT COMMUNICATIONS MANAGEMENT ON CONSTRUCTION PROJECTS IN GHANA AND HOW EFFECTIVE AND APPLICABLE IT CAN BE APPLIED ON CONSTRUCTION SITE MANAGEMENT

Table 4.3 (a) shows the summary of how effective some of the means and channels of effective project communication within the construction sector. Some of the means or channels are effectively applied to enhance the productivity in the construction industry while others means of communication are rarely used or applied in within the construction industry.

Table 4.3 (a) indicates which means or channels of communication are practically used and how effective it can help in dealing with communication challenges in the construction industry.

Means and Channels of Project Communication on Construction Site Management	Frequency	Comparison of High and Low Percentages			Effectiveness
			High Percentages (%)	Low Percentages (%)	
Face to face	85	63.9	4.5	Very effective	
Phone	91	68.4	31.6	Very effective	
Meetings	90	67.7	7.5	Very effective	
Project Intranet	59	44.4	6.8	Effective	
Memo	72	54.1	3.8	Effective	
Email	40	30.1	15.8	Moderately effective	
Correspondence	58	43.6	3.0	Moderately effective	
Graphic e.g Safety signs photographs	62	46.6	6.0	Moderately effective	
Fax	46	34.6	7.5	Not effective	
Post	47	35.3	3.8	Moderately effective	
WhatsApp	61	45.9	6.8	Very effective	
LinkedIn	57	42.9	3.0	Not effective	
Twitter	70	52.6	3.8	Not effective	
Facebook	48	36.1	9.8	Very effective	
Intercom	55	41.4	3.8	Very effective	
Instagram	71	53.4	6.8	Not effective	

Source: Author Own Construct from Field Work, 2020

Table 4.3 (b) Summary of the various means and channels used by project professionals in managing and resolving project communication management challenges on construction site

Means of Communications	Level of effectiveness of construction project communication					
	1 = Not effective	2 = Less effective	3 = Moderately effective	4 = Effective	5 = Very effective	Total
FACE – TO - FACE						
Frequency	0	0	6	42	85	133
Percent (%)	0	0	4.5	31.6	63.9	100
PHONE CALL						
Frequency	0	0	0	42	91	133
Percent (%)	0	0	0	31.6	68.4	100
MEETINGS						
Frequency	0	0	10	33	90	133
Percent (%)	0	0	7.5	24.8	67.7	100
PROJECT INTRANET						
Frequency	9	5	41	59	19	133
Percent (%)	6.8	3.8	30.8	44.4	14.3	100
MEMO						
Frequency	5	10	22	72	24	133
Percent (%)	3.8	7.5	16.5	54.1	18.0	100
EMAIL						
Frequency	0	21	40	39	33	133
Percent (%)	0	15.8	30.1	29.3	24.8	100
CORRESPONDENCE						
Frequency	0	28	58	43	4	133
Percent (%)	0	21.1	43.6	32.3	3.0	100
GRAPHICS EXAMPLE, SAFETY SIGNS PHOTOGRAPHS						
Frequency	10	8	62	36	17	133
Percent (%)	7.5	6.0	46.6	27.1	12.8	100
FAX						
Frequency	46	39	38	0	10	133
Percent (%)	34.6	29.3	28.6	0	7.5	100
POST						
Frequency	34	26	47	5	21	133
Percent (%)	25.6	19.5	35.3	3.8	15.8	100
WHATSAPP						
Frequency	9	14	18	31	61	133
Percent (%)	6.8	10.5	13.5	23.3	45.9	100
LINKEDIN						
Frequency	57	53	19	0	4	133
Percent (%)	42.9	39.8	14.3	0	3.0	100
TWITTER						
Frequency	70	33	11	5	14	133
Percent (%)	52.6	24.8	8.3	3.8	10.5	100
FACEBOOK						
Frequency	28	21	13	23	48	133
Percent (%)	21.1	15.8	9.8	17.3	36.1	100
INTERCOM						
Frequency	37	21	5	15	55	133
Percent (%)	27.8	15.8	3.8	11.3	41.4	100

INSTAGRAM						
Frequency	71	53	0	9	0	133
Percent (%)	53.4	39.8	0	6.8	0	100

Source: Author Own Construct from Field Work, 2020

From the table 4.3 (b) shows how respondents in their own view practically applied some of the basic means and channels in managing project communication on site. From the table 4.3 (b) above 63.9% shows that face-to-face is one of the major channel used by construction project professionals in addressing their communication challenges. From table. 4.3 (b) one can justify that face-to-face 63.9%, meetings 67.7%, phone call 68.4%. memo 54.1%, project intranet 44.1%, WhatsApp 45.9%, Facebook 36.1% and intercom 41.4% are the most effective means used by construction professionals to disseminate information easily to their clients or employees at the work site, also: others means such as emails 30.1%, correspondence 43.6%, graphic 46.6% are moderately used effectively whiles fax 34.6%, LinkedIn 42.9%, twitter 52.6% and Instagram 53.4% rarely used by construction project professionals to deal with industry communication issues. About 90% of construction projects are successfully completed and by effectively managed by effective projection communication.

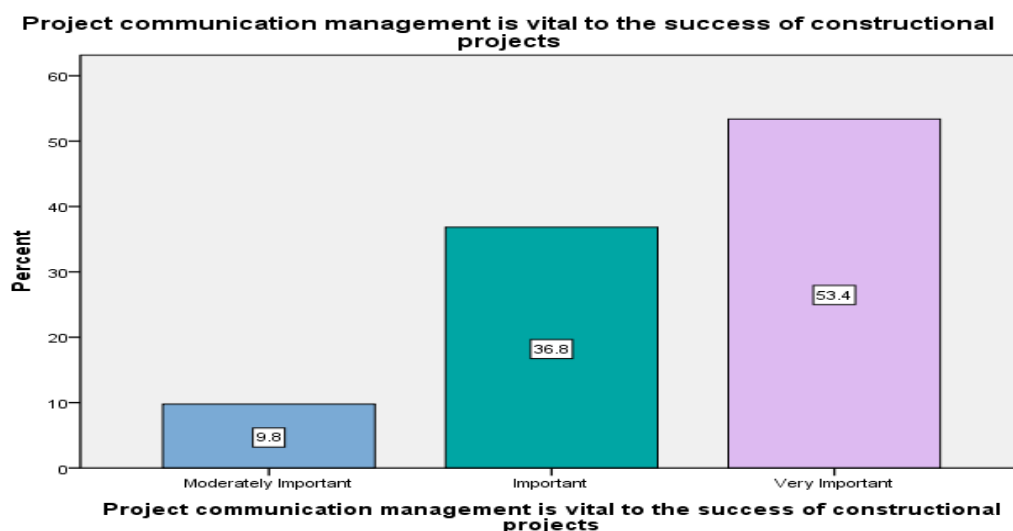
4.4 THE SIGNIFICANCE OF PROJECT COMMUNICATION MANAGEMENT IN CONSTRUCTION INDUSTRY IN GHANA

Professionals were asked to assess how true or otherwise the following statement were with regards to project communication in the construction industry in Ghana:

- ✓ Site meetings are an important channel of communication between the consultants and contractor on site.
- ✓ Training of operatives is necessary for onsite communication.
- ✓ Poor communication often results into delay, increase in cost, abandonment, amongst other problems.
- ✓ Poor and distorted information will affect the level of work done on site.
- ✓ Inexperience interpretation of working drawings can cause a failure in building components.
- ✓ Poor means of communication leads to distorted information on site.
- ✓ The importance of language used among operatives is very essential for effective communication on site.
- ✓ Late dissemination of information will affect output on site negatively.

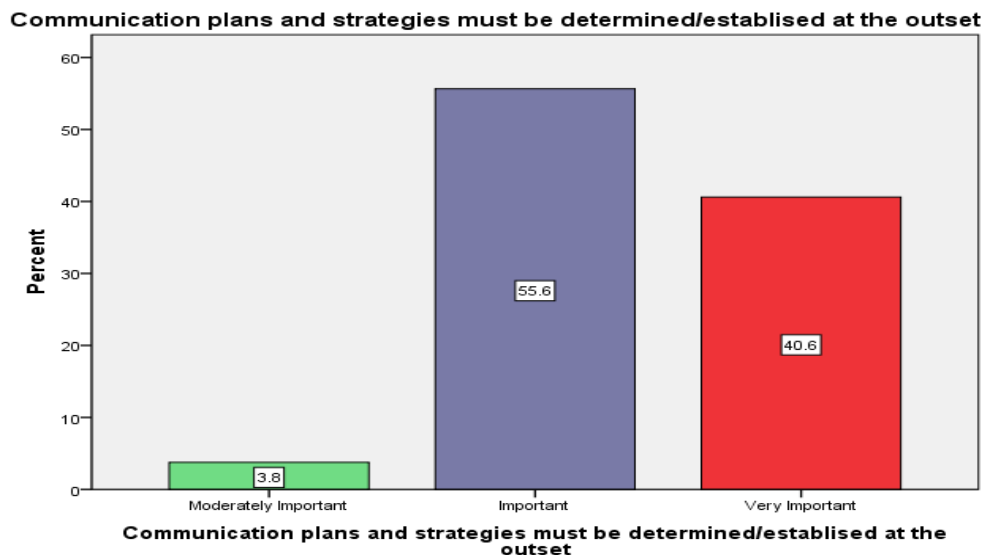
4.4.1: Clients' Responses to the Relative Importance of the General Overview of Communication on Projects in Ghana.

Figure 4.4 (a) is a Bar Chart Showing Clients Responses to the Relative Importance of the General Overview of Communication on Construction projects in Ghana.



Source: Field Work, 2020

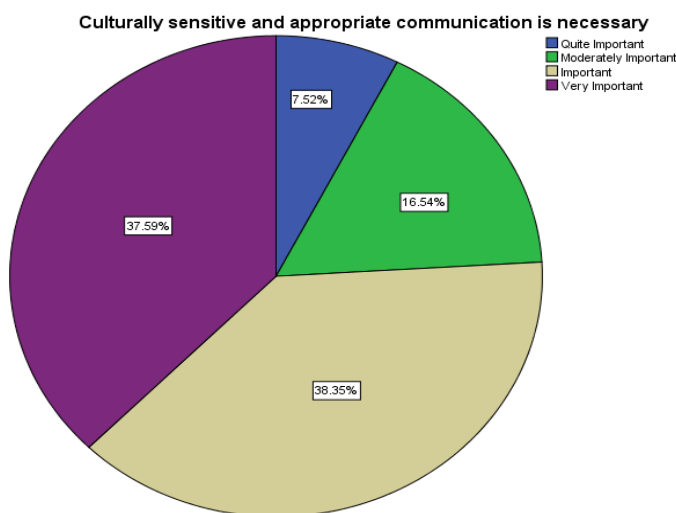
From figure 4.4 (a) About 54.4% of project clients or respondents agree to the assertion that project communication management is very important to the success of constructional projects only 9.8 moderately or to some extent agree to this statement. Figure 4.4 (b) is a Bar Chart showing the Importance of Communication Management plans and strategies to ensure successful completion of construction projects



Source: Field Work, 2020

From figure 4.4 (b) shows about 55.6% of project clients or respondents agree to the assertion that communication management plans and strategies must be established at the outset while only 3.8% moderately agree to this statement. Out of a total of 133 construction industry clients' respondents, 128 of them representing 96.2% said that it is important or very important to setup or establish communication plans and strategies at the onset of projects to ensure project success. Only 5 clients' respondents representing 3.8% said that setup or establishment of communication plans and strategies at the onset of projects is neither important or its importance is insignificant.

Figure 4.4 (c) is a Pie Chart Showing the Relative Importance of Cultural sensitivity in communication management for a



successful completion of construction projects in Ghana

Source: Field Work, 2020

From figure 4.4 (c) shows that about 38.59% of project clients or respondents agree to the assertion that communication management is culturally sensitive and appropriate communication is necessary while only 7.52% fairly agree to this statement that communication is vital to project success. Out of a total of 133 construction industry clients' respondents, 101 of them representing 72.9% said that it is important or very important to note that cultural sensitivity and appropriate communication is necessary to ensure project success. However only 10 clients' respondents representing 7.52% said that cultural sensitivity and appropriate communication is neither important or its importance is insignificant.

Figure 4.4 (d) Pie Chart showing the Relative Importance of Communication Management skills that must possessed by project managers in supervising and managing construction projects on site



Source: Field Work, 2020

From figure 4.4 (d) indicates that about 68.42% of project clients or respondents agreed to the assertion that communication management skills are essential for project managers and others professionals on site to managed construction projects efficiently while only 2.26% moderately agreed to this statement that communication skills are vital to project success. Out of the 133 contractors' respondents 130 of them representing 97.3% said that it is important or very important for a project manager(s) to have excellent communication skills in order to oversee an effective communication on a project while 3 of the respondents representing 2.3% also said that for a project manager(s) to have excellent communication skills in order to oversee an effective communication is moderately important or its importance is insignificant.

Table 4.4 (a) Shows that Two-way communications must be encouraged at construction project site

Respondents Views	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Quite Important	4	3.0	3.0	3.0
Moderately Important	3	2.3	2.3	5.3
Important	53	39.8	39.8	45.1
Very Important	73	54.9	54.9	100.0
Total	133	100.0	100.0	

From table 4.4 (a) shows that about 54.9% of respondents agreed to the assertion that two-way communication strategies must be encouraged at project site while only 2.3% moderately agree to this statement, hence two-way communication strategies must be established in all project sites. Out of a total of 133 respondents who were contractors in the construction industry in Ghana, 126 of them representing 94.7% said is important or very important to encourage two way communications on construction projects in Ghana in order to improve project success. However only 3 contractors' respondents representing 2.3% said that two way communications on construction projects in Ghana is not important or its importance is insignificant.

Table 4.4 (b) On-going communications between project proponents and its stakeholders is very essential to project success

Respondent Views	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Moderately Important	23	17.3	17.3	17.3
Important	63	47.4	47.4	64.7
Very Important	47	35.3	35.3	100.0
Total	133	100.0	100.0	

Table 4.4 (b) indicates that about 47.7% of respondents agreed to the assertion that on-going communications between project proponents and its stakeholders should be encouraged to ensure free flow of information between both parties on site. Out of a total of 133 respondents who were contractors in the construction industry in Ghana, 110 of them representing 82.7% said that an on-going communication between the project proponents (team) and its stakeholders is important or very important in improving project success. However only 23 of respondents representing 17.3% said that an on-going communication between the project proponent and its stakeholders is moderately important or its importance is insignificant.

Table 4.4 (c) Shows how effective communication is reflecting openness and tolerance of cultural differences on construction project site

Respondent Views	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Quite Important	9	6.8	6.8	6.8
Moderately Important	27	20.3	20.3	27.1
Important	60	45.1	45.1	72.2
Very Important	37	27.8	27.8	100.0
Total	133	100.0	100.0	

Table 4.4 (c) Shows that 45.1% of respondents agreed to the statement that effective communication is reflecting openness and tolerance of cultural differences while only 6.8% fairly agreed to that assertion, effective communication ensures openness and tolerance that should be encouraged on project site. Out of a total of 133 respondents who were contractors in the construction industry in Ghana, 97 of them representing 72.9% said that it is important or very important to have an effective communication reflect openness and tolerance of cultural differences on projects. On the other hand, 9 respondents representing 6.85% said that it is moderately important to have effective communication that reflect openness and tolerance of cultural differences on projects.

Table 4.4 (d) Shows that clear communication clarifying roles for project stakeholders

Respondents views	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Quite Important	4	3.0	3.0	3.0
Moderately Important	22	16.5	16.5	19.5
Important	60	45.1	45.1	64.7
Very Important	47	35.3	35.3	100.0
Total	133	100.0	100.0	

Table 4.4 (d) Shows that about 45.1% of respondents agreed to the assertion that clear communication clarifying roles for project stakeholders is actually required while only 3% moderately or somewhat important agreed to this statement. Out of a total of 133 respondents who were clients in the construction industry in Ghana, 107 of them representing 80.4% said that it is either important or very important to have a clear communication clarifying roles of stakeholders drawn out in the project communication plan. Only 4 clients' respondents said that to have a clear communication clarifying roles of stakeholders, drawn out in the project communication plan is not important or its importance is insignificant.

Table 4.4 (e) Shows that Open communication is required to provide management with some control on project site.

Respondents views	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Not Important	3	2.3	2.3	2.3
Quite Important	10	7.5	7.5	9.8
Moderately Important	27	20.3	20.3	30.1
Important	57	42.9	42.9	72.9
Very Important	36	27.1	27.1	100.0
Total	133	100.0	100.0	

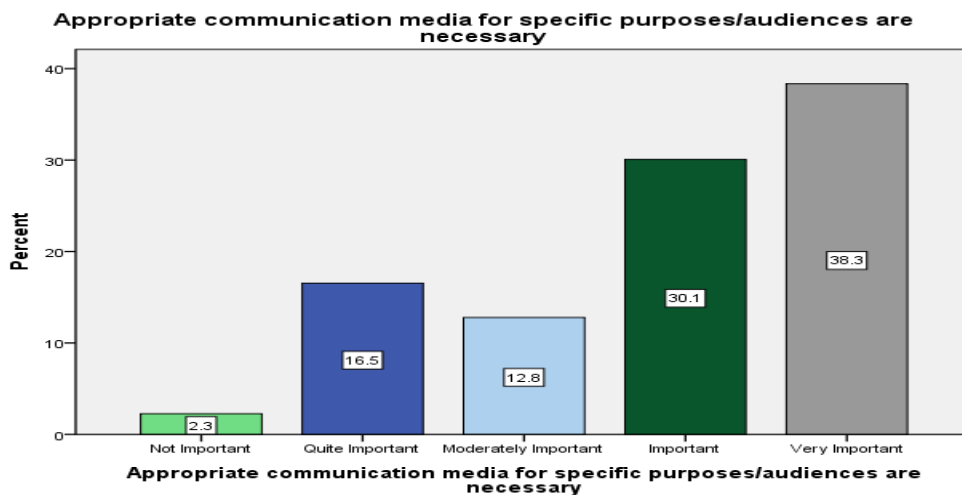
Table 4.4 (e) Shows that about 42.9% of respondents attest to the fact that open communication is required to provide management with some control on project site while only 2.3% fairly disagreed to this assertion. Open communication is required to provide management with some control. With a total of 133 respondents who were contractors in the construction industry in Ghana, 93 of them representing 70% of the respondents respectively said that an open communication is important or very important to provide management with some control while only 3 contractors' respondents representing 2.3% said that an open communication is not important or not insignificantly important to provide management with some control. And significant number of respondents numbering 27 representing 20.3% said that open communication is moderately (or somewhat) important to provide management with some control.

Table 4.4 (f) Indicates that meetings help overcome communication barriers and increase performance level

Respondent views	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Not Important	3	2.3	2.3	2.3
Moderately Important	12	9.0	9.0	11.3
Important	35	26.3	26.3	37.6
Very Important	83	62.4	62.4	100.0
Total	133	100.0	100.0	

Table 4.4 (f) Indicates that about 62.4% attest to the fact that meetings help overcome communication barriers and increase performance level on construction project site while only 2.3% impartially agreed to this assertion. A total of 133 respondents who were clients were interviewed in the construction industry in Ghana, 118 of them representing 88.7% respectively said that meetings are important or are very important in overcoming communication barrier and increasing performance level of a project. However, 4 clients' respondents said that meetings are not important or insignificantly important in overcoming communication barriers and increase project performance. There were also 3 respondents representing 2.3% who said that the effect on meetings in overcoming project communication barrier is not important.

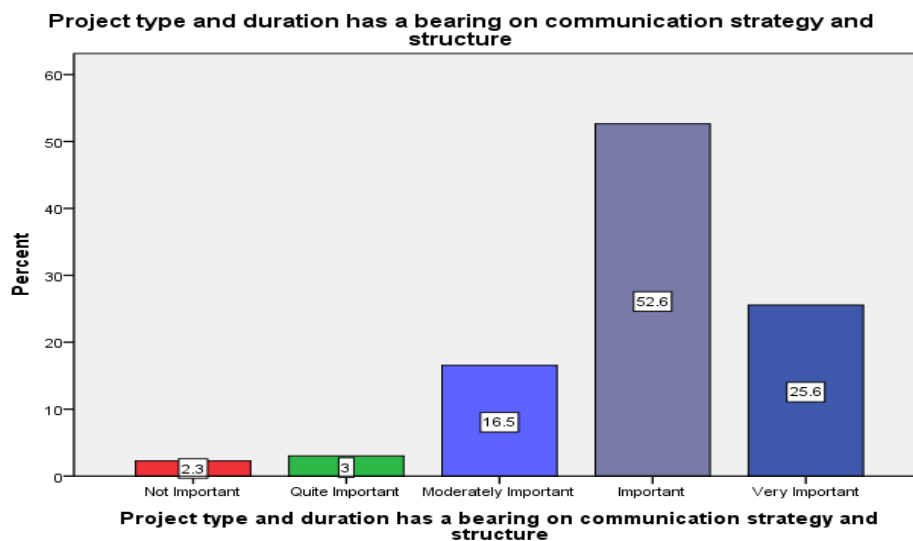
Figure 4.4 (e) is a Bar Chart that shows that appropriate communication media for specific purposes/audiences are necessary for successful completion of construction projects.



Source: Field Work, 2020

Figure 4.4 (e) Shows that about 38.3% confirmed that appropriate communication media for specific purposes/audiences are necessary for successful completion of construction projects while only 2.3% disagreed with this assertion. A total of 133 respondents who were contractors were interviewed in the construction industry in Ghana, 91 of them representing 68.3% said that it is important or very important to have appropriate communication media for specific purposes/audiences. Only 3 contractor's respondents representing 2.3% said that appropriate communication media for specific purposes/audiences is not important or not insignificantly important.

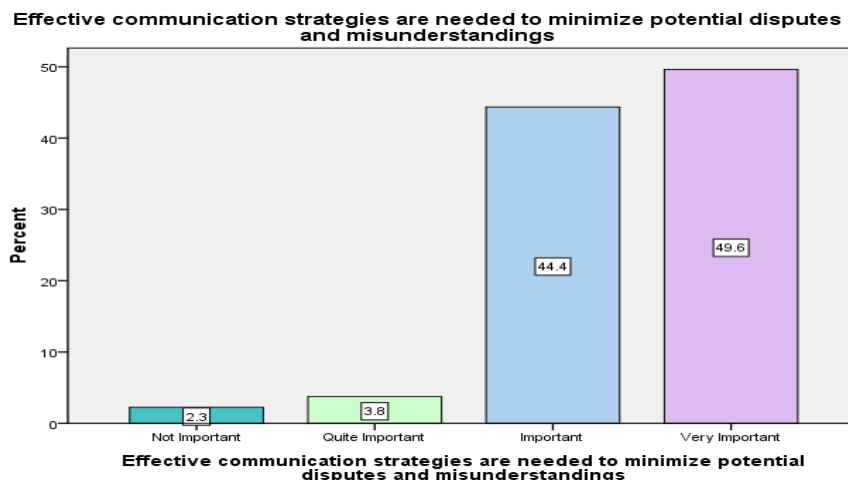
Figure 4.4 (f) is a Bar Chart that shows that project type and duration has a bearing on communication strategy and structure for successful completion of construction projects.



Source: Field Work, 2020

Figure 4.4 (f) Shows that about 52.6% of respondents confirmed that project type and duration has a bearing on communication strategy and structure for successful completion of construction projects while only 2.3% disagreed with that assertion. Out of a total of 133 respondents who were contractors' in the construction industry in Ghana, 104 of them representing 82.2% said that project type and duration of the project is important or very important in determining the communication strategy and structure of the project. However only 3 contractors' respondents representing 2.3% said that project type and duration of the project is neither important or its importance is insignificant.

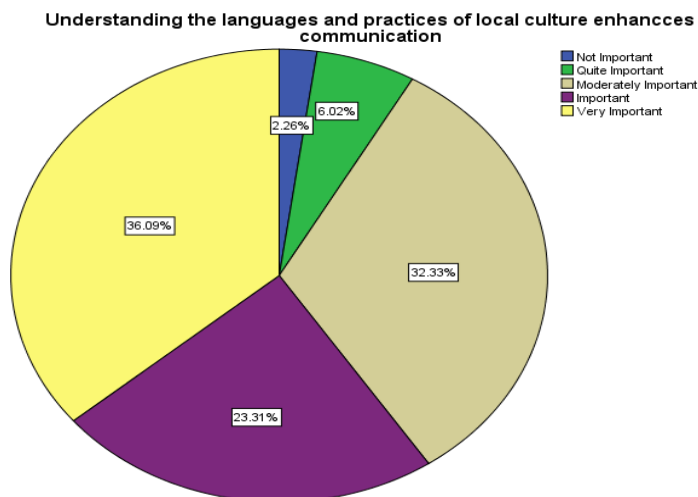
Figure 4.4 (g) is a Bar Chart that shows that effective communication strategies are needed to minimize potential disputes and misunderstandings for successful completion of construction projects.



Source: Field Work, 2020

Figure 4.4 (g) Shows that about 44.4% of respondents confirmed that effective communication strategies are needed to minimize potential disputes and misunderstandings for successful completion of construction projects while only 2.3% disagreed with that assertion. Out of a total of 133 respondents who were contractors' in the construction industry in Ghana, 125 of them representing 94% of respondents said that project type and duration of the project is important or very important in determining the communication strategy and structure of the project. However only 3 contractors' respondents representing 2.3% said that project type and duration of the project is neither important or its importance is insignificant.

Figure 4.4 (h) is a Pie Chart that shows that understanding the language(s) and practices of local culture enhances communication for successful completion of construction projects.



Source: Field Work, 2020

Figure 4.4 (h) shows that about 36.09% of respondents agreed to the assertion that understanding the language(s) and practices of local culture enhances communication for successful completion of construction projects while only 2.26% disagreed to such claim. Out of a total of 133 respondents who were contractors' in the construction industry in Ghana, 79 of them representing 59.4% of the respondents said that understanding the language(s) and practices of local culture enhances communication. However only 3 contractors' respondents representing 2.3% said that understanding the language(s) and practices of local culture enhances communication is neither important or its importance is insignificant.

Figure 4.4 (i) is a Pie Chart that shows that communication gives project stakeholders the opportunity to comment or cast a vote for a successful project completion.

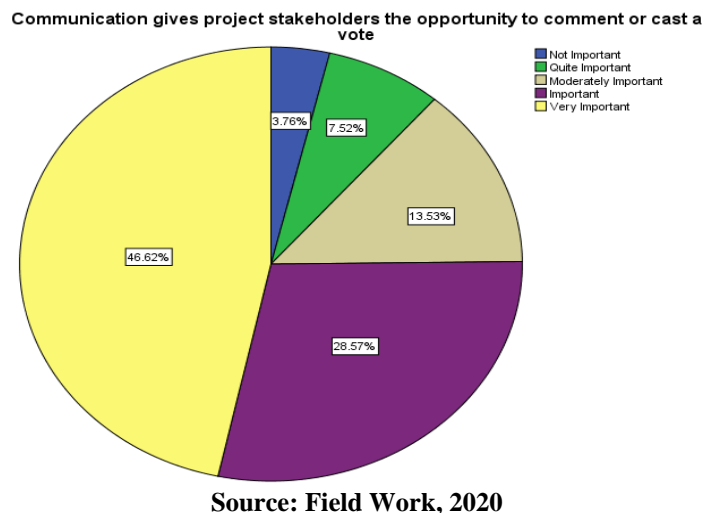


Figure 4.4 (i) shows that about 46.62% of respondents agreed to the claim that communication gives project stakeholders the opportunity to comment or cast a vote for successful completion of construction projects while only 3.76% disagreed to such assertion. Out of a total of 133 respondents who were contractors’ in the construction industry in Ghana, 100 of them representing 75.2% of the respondents said that communication gives project stakeholders the opportunity to make comments or cast a vote for a successful completion of a project, however only 5 contractors’ respondents representing 3.8% said that communication gives project stakeholders the opportunity to make comments or cast a vote in favor of a project is neither important or its importance is insignificant.

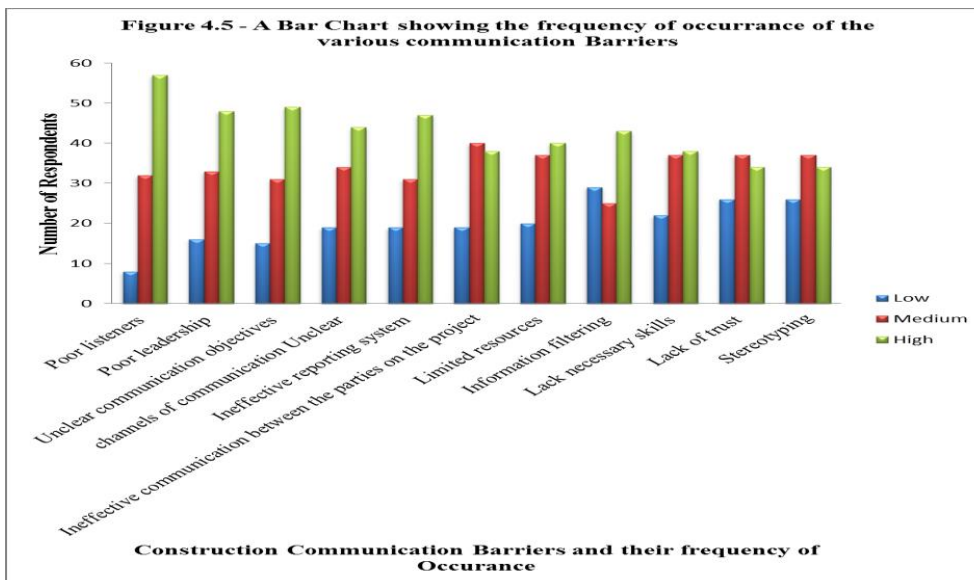
4.5 BARRIER TO COMMUNICATION MANAGEMENT ON CONSTRUCTION PROJECTS IN GHANA

Respondents were asked to state how frequent the following communication barriers occur during project initiation through to post implementation review. The frequency index formula was used to rate the frequency of occurrence for each of the communication barrier: High (3), Medium (2), or Low (1). This method of analyses was used to find out the communication barriers which were really occurring on construction projects. Frequency Index (F.I) =: where n1 is the number of respondents who answered “high”, n2 the number of respondents who answered “medium” and n3 the number of respondents who answered “low”. The respondents asked to rate the frequency of occurrence for each of the communication barrier according to three ordinal scales: high (3), medium (2), or low (1). “The frequency index” for each cause was derived from the frequency index formula. Their responses have been tabulated and presented in the table and graph below:

Table 4.5: Shows the ranking of all Respondents on Barrier communication in construction projects

Barrier to communication in construction projects	Frequency of occurrence of each factor quoted by Respondents			Total number of Respondents	Frequency Index (F.I.)	Rank
	1	2	3			
All Respondents	1	2	3			
Poor listeners	8	32	57	97	0.835	1
Poor leadership	16	33	48	97	0.777	2
Unclear communication objectives	17	31	49	97	0.777	2
Unclear channels of communication	19	34	44	97	0.753	5
Ineffective reporting system	19	31	47	97	0.763	4
Ineffective communication between the parties on the project	19	40	38	97	0.732	7
Limited resources	20	37	40	97	0.735	6
Information filtering	29	25	43	97	0.715	9
Lack necessary skills	22	37	38	97	0.722	8
Lack of trust	26	37	34	97	0.694	10
Stereotyping	26	37	34	97	0.694	11
Language difficulties	27	36	34	97	0.691	1

Source: Field Work, 2020

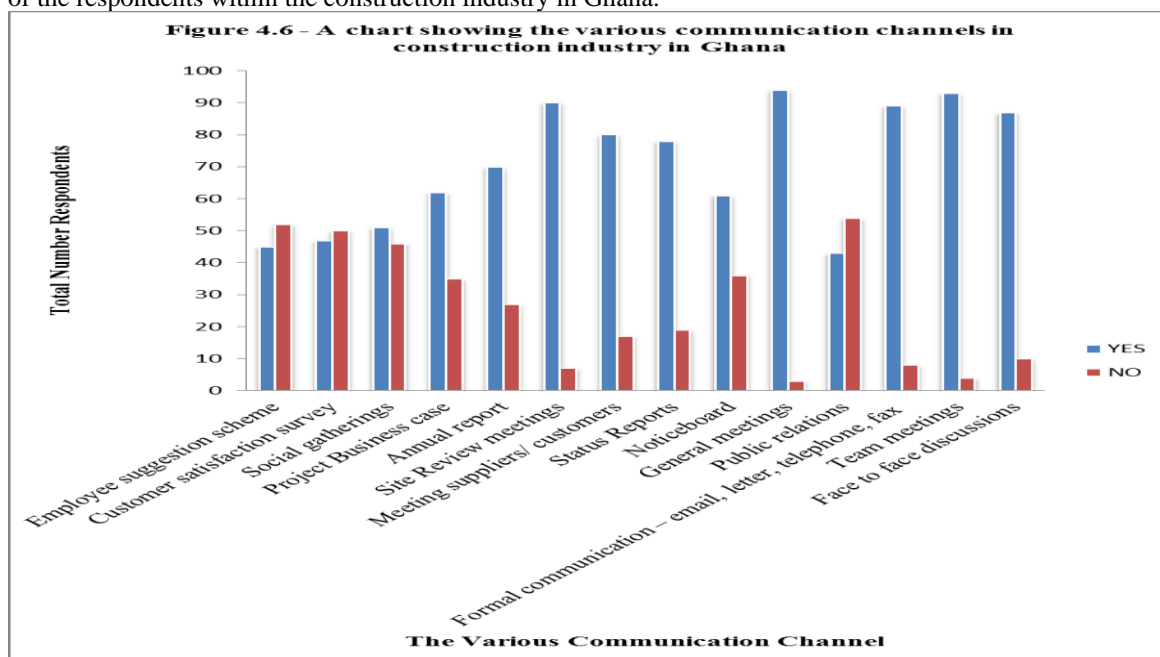


Source: Field work, 2020

Table 4.5 and figure 4.5(a) summarize the frequency of occurrence indices and the ranks for each of the communication barriers as perceived by all the three contact groups of respondents.

4.6 CHANNELS OF COMMUNICATIONS

There are many channels of communication however in relation to project communication, fourteen (14) various channels were made available to respondents to choose from which are used on their construction projects. Figure 4.6 below presents the responses of the respondents within the construction industry in Ghana.



Source: Fieldwork, 2020

4.7 DISCUSSIONS / COMMENTS OF RESPONSES

According to Neureiter (2005) communication is a widespread term, therefore establishing an efficient project related information system means to decompose communication the following three broad themes; **Project reporting:** The written documents regarding project communication which contain feedback for the team members about project events are called reports. Reporting therefore includes all documents in written form giving all groups of interest orientation about the project’s progress. The goal of this approach is to show the current state of the project and predict future outcomes as well. **Project documentation:** A requirement for targeted project documentation is a practicable order of the project documents. All project documents have to be easily accessible, which makes introducing a structure for the project documents necessary. Depending on the size of the project, the project documentation can vary and should be adequate. **Direct Communication:** This form of communication is neither report nor documentation and would usually include face to face meetings etc. The various fourteen (14) communication channels put forward by the researcher and selected by the respondents in the industry was consistent with the three broad communication categories and channels as suggested by Neureiter (2005). Their results are also supported by Carlsson et.al. (2001) who conducted communication research

within the Swedish construction industry. These findings indeed reflected in the outcome of this research as well. From the channels of communications responses as seen in figure 4.6 above all the various communication channels that dealt with some form of face to face contact interaction had the highest number of respondents as what is truly taking place on construction site in Ghana. For instance; face to face discussion, team meetings, site meeting as well as general meeting seem to happen at every construction site in Ghana. One character of communication is that information is transferred from place A to place B. In an organizational context, this generally means a flow of information from the top management down through different project levels. On every level, a part of the information disappears or changes significantly. These are all attributable to communication barriers which could either be an external or internal (Lohtaja & Kaihoviirta-Rapo 2007). Again, Carlsson et.al, (2001) had argued that “barriers to effective communication are likely to be broken down by more integrated project delivery systems. From the table 4.6 and figure 4.5, it can be clearly seen that the eleven (11) most frequent barriers to communication on Ghanaian construction projects from the combined perspective of all the three contact groups Furthermore, Maslej (2006) noted that to better understand the concept of communication in the construction industry, it is important to acknowledge the roles, responsibilities.

4.7 IDENTIFYING CRITICAL FACTORS THAT CAUSES COMMUNICATION DELAY IN GOVERNMENT CONSTRUCTION PROJECTS IN GHANA

Respondents for this study were asked to rank the critical factors causing communication delays in government construction project and how each factor significantly contributes to the delays. The critical factors that causes communication delays were identified to be twenty-three (23) which were observed to be significant. To determine the importance of the factors that causes the project communication delay, the Relative importance index (RII) was used. The Relative index of 70 percent and above was chosen to be highly significant. This means that the first twelve ranking were highly important. As shown from Table 4.7, the first two factors, thus inadequate financial resources of clients with relative index of 96% and delays in honoring payment certificate for work done with index of 93% were the most important cause of delay. And by ranking, it implies all the respondent ranked these two factors as extremely important contributing factor of delay. The third and fourth ones were equally extremely important, thus, underestimation of project duration with 83% poor communication between contracting parties with index of 82%. The rest of the factors are ranked in table 4.7 as shown below:

Table 4.7: Shows Relative Important Index (RII) of critical factors that causes project communication delays in government construction projects in Ghana

Critical factors that causes project communication delays	RII	Ranking
Lack of complete document before commencement	0.520	23
Delays in honoring payment for work completed	0.930	2
Foundation conditions encountered on site	0.650	18
Errors in design and specification	0.750	11
Poor communication between contracting parties	0.820	4
Complexity, difficulties in access bank credit (client)	0.790	5
Change orders during construction	0.780	6
Delay in instruction from consultants	0.770	10
Building approved delays by statutory authorities	0.660	15
Materials procurement difficulties	0.650	17
Unfavorable site conditions	0.610	20
Mistake in soil investigation	0.650	19
Bureaucracy in decision making	0.770	8
Delays in sub-contractors work	0.780	7
Underestimation of the project cost	0.740	12
Poor supervision of work on site	0.690	13
Contractors poor site management	0.680	14
Complexity, difficulties in accessing bank credit (contractors)	0.660	16
Increment weather condition	0.580	21
Material price escalations	0.570	22
Insufficient financial resources of clients	0.960	1
Underestimation of the project duration	0.830	3
Contractors improper planning during construction	0.770	9

Source: Field work, 2020

4.7.1 Discussion of result on critical factors contributing to project communication delays

Brief discussion on the critical factors causing delays in construction projects in the descending ranking order.

4.7.2 Insufficient financial resources of clients

The inadequate client’s financial resource with relative index of 0.960 was ranked first as the extremely significant contributing factor of delay by respondents. This may also lead to delay in honoring payment certificates for work done which was ranked second with an index of 0.930 as also significant contributing factor of delay. A research conducted by Fugar and Agyakwah-Baah (2010) found these problem as the main contributing factor that cause delay in building project in Ghana. Payment delays may result in cost over runs hence adequate funding prior to the award of contract is seem necessary to ensure that project cost remains within

budget. To reduce these challenges, contracting parties most especially the client should address the challenges related to funding before project commencement and prepare a good payment schedule to ensure that payments are honored on time.

4.7.3 Underestimation of the project duration

Underestimation of the project duration was ranked third with relative index of 0.830. In order to ensure that costs are kept within budget, historical data which affect project costs such as size of project, proper scope definition, etc. must be kept and properly communicated to project stakeholders. According to Bill et al, 2006 a consistent mistake is that adjustment for myriad factor are not made and similarly, the basis of any cost estimate is to determine to project scope, design and specifications (Beattie, 2002).

4.7.5 Complexity in accessing bank credit

This was ranked fifth with index of 0.780. All construction projects need adequate funding for successful execution and completion which must be communicated to all stakeholders involved within the project. A study conducted by Mbachu and Nkado (2004) revealed that globally, the construction industry is plaque with cost overruns in project delivery which makes it unattractive for investors. Contributing factors six to ten are all significant causes of delay that need solutions to minimize its effect in project execution. Human resources schedule, quality plan, plant and equipment schedule and work schedule plan all put together will reduce delays to breasts minimum.

5.3 Recommendations and Conclusion

Within the Ghanaian construction industry, there is a strong appreciation of the importance of project communication and its importance within the industry. Indeed, various levels and channels of communications have been established within the construction industry, for example communication between the clients and consultants or consultants and contractors. In spite of that, there have been many hindrances to effective communication on construction project in Ghana. These includes; poor listeners, poor leadership, unclear communication objectives, unclear channels of communication, ineffective reporting system, ineffective communication between the parties on the project, stereotyping and language difficulties. Finally, the research established that poor communication had resulted in project delays; project cost overrun; project abandonment. Other critical factors that causes construction projects delays cannot be overemphasize among which includes: lack of complete document before project commencement; poor communication between contracting parties; errors in design and specification; underestimation of the project cost; insufficient financial resources of clients; poor supervision of work on site; underestimation of the project duration; contractors improper planning during construction; complexity, difficulties in accessing bank credit; contractors poor site management; bureaucracy in decision making; delay in instruction from consultants; foundation conditions encountered on site; building approved delays by statutory authorities as well as materials procurement difficulties. This research has shown that about 90% of construction projects largely relies on effective communication project between the project stakeholders and the team members. Project communication strongly affects the performance of professionals within the construction industry. Therefore, clearly establishing and managing the structures of communication on projects must always be on the schedule plan of team leaders and management before the commencement of every project within Ghana and beyond. In the near future further research could be conducted on “the impact of project communications and its influence in the Ghanaian construction industry using Tamale Interchange Construction as a Case study”

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