COMMUNICATION FACTORS FOR MANAGING CONSTRUCTION PROJECTS DELIVERY AMIDST CORONA VIRUS PANDEMIC IN ANAMBRA STATE

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CERTIFICATION

This is to certify that this study; Analysis of Communication Factors for Managing Construction Projects Delivery Amidst Corona Virus Pandemic in Anambra State, is the original work of Chukwuneke, Chetanna Jude (Reg. No. 20174080878) of Department of Project Management Technology, School of Management Technology (SMAT) of the Federal University of Technology, Owerri, in partial fulfilment for the award of a Master Degree in Project Management Technology.

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DEDICATION

This research is dedicated to Almighty God for His blessings and sustenance throughout this study and research work.

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ABSTRACT

The activities of the construction industry are very vital to the growth and development of every society especially in developing nations like Nigeria, but the success of a project largely depends on the efficiency of its communication network, especially in the wave of Corona virus (COVID 19) with its attendant protocols. The restriction on movement due to lockdown during this time has really bridged the communication factors. This research therefore is on communication factors for managing construction projects delivery amidst Corona Virus pandemic in Anambra State. To elicit responses for the study, specific objectives include: to identify the major communication factors affecting managing construction projects delivery amidst COVID-19 pandemic in Anambra state, to analyse the extent of effect of drone technology for managing construction projects delivery amidst COVID-19 pandemic in Anambra state, to evaluate the influence of written communication in managing construction projects delivery amidst COVID-19 pandemic in Anambra and to investigate the extent of effect of communication with a social medium on project delivery performance amid COVID-19 pandemic in Anambra State while hypotheses and research questions were also formulated to align with the objectives of the study. Literatures were reviewed, and the study adopted exploratory survey research designs. Data were sourced from 87 respondents from the company. The instrument was validated and was also subjected to reliability which has internal consistency of 0.7r was used for data collection. A test re-test method was used to determine the reliability of the instrument and the result were appropriately scored. The data obtained were analyzed using both descriptive and inferential statistics. The results show that Oral and visual communication, social media communication, electronic communication and written communication are the major communicating factors for the company during pandemic. Recommendations were made towards adopting appropriate communication factors during construction project delivery in Anambra State during COVID-19 pandemic.

KEYWORDS: Communication, projects, delivery, Pandemic

CHAPTER ONE

INTRODUCTION

1.1 Background Information

The success of a project largely depends on the efficiency of its communication network, especially in the wave of Corona virus (COVID 19) with its attendant protocols. Effective communication has always been the key to all healthy relationships. However, during the compulsory corona virus stay at home (quarantine), many individuals were working from home with little to no face- to-face interactions, except with their families (Yvonne, 2020). Communication starts working from day one of the project and continues for the entire life span of the project. Communication provides steady updates to notify the progress of the project as well as its performance capacity.

But surprisingly, it has been found that most projects experience a breakdown in communications (Phillips, 2017). It should be emphasized that the activities of the construction industry are very vital to the growth and development of every society especially in developing nations like Nigeria. Its success or failure affects both the economic status and social lives of everyone in the society. Despite the high expectations from the Nigerian construction industries and its calibre of various professionals such as Professional Project Managers, Architects, Quantity Surveyors, Civil Engineers, Structural Engineers, Electrical Engineers and Service Engineers etc. construction project delivery has continued to suffer numerous setbacks during project delivery hence, leading to severe conflicts, project failure and subsequent abandonment. However, construction projects are characterized by its dynamic nature, fragmented nature, resources integrated requirement and its dependence on the skills, capabilities and knowledge of various human resources that may be skilled or unskilled labour, trained or professional managers (Shahatit, 2016). Unfortunately, this dynamic nature of construction project was altered as a result of corona virus outbreak and its restrictions on communication, especially, face-to-face.

There is no doubt that one of the most significant and substantial areas of construction project delivery is communication management which according to the Project Management Body of Knowledge (PMBOK) is a fundamental area in the management of projects which determines the most effective approach for generating, retrieving, processing, storing and sharing of quality and tangible project information on time and in an orderly manner to various stakeholders in order to facilitate successful project delivery (PMI, 2015). Weldearegay (2012) further argued that without effective communication, all construction project resources both human and materials cannot be effectively managed and utilized for timely delivery of construction project. This is based on the fact that information regarding clients‟ requirements, system requirements, construction methodology, and project specification/requirements must be adequately and effectively communicated to all relevant project stakeholders to ensure the realization of quality of conformance and performance of projects.

The term communication has been used by various professionals and authorities to define the process for information dissemination within an environment they also agreed that without communication no organization will exist or survive hence effective communication is an essential element for any organisation that wants to gain competitive advantage and operational excellence in both local and global market (Ishaq, Omar & Mohamed, 2018). Unfortunately, results from various studies have revealed that poor communication among the various project stakeholders is one of the most significant factors contributing to low productivity of the Nigeria construction industry especially on the quality and timely delivery of construction projects.

As a developing nation, the need for construction project in both rural and urban regions has continued to be on high demand; there is also a higher need for improved quality of performance and timely delivery in the management of construction projects. Thus, it is against this

background that this study was set to investigate and examine the role of communication management as a veritable tool in the successful delivery of construction projects at Nnamdi Azikiwe University Teaching Hospital (NAUTH) both temporary and permanent sites, Nnewi.

1.2 Problem Statement

For project managers, the impact of COVID-19 on operations has been catastrophic. A reliance on remote work has obstructed the collaborative approaches often seen within a traditional team environment. Lockdowns and border closures have caused a major disruption to supply chains, and the risk of operating a business and managing projects have skyrocketed.

The various phases of the construction project lifecycle require information such as client requirement, project specification, technical drawings, work- breakdown structures and methods of construction etc. which must be communicated to all stakeholders involved throughout the project lifecycle to ensure success. Despite the significant role of effective communication management in construction projects, project managers and stakeholders in developing economy have not paid adequate attention to the roles and impact of effective communication during construction project execution hence the reasons for the high rate of conflicts, delays in project delivery, decline in productivity and poor quality of conformance and performance.

However, the recent outbreak of Corona Virus (COVID-19) has seriously affected the traditional communication channels such as face-to-face project meetings, moving from office to office documentation, etc., and lowered the productivity of project stakeholders in many ramifications. Hence, as the business world continues to move towards becoming a global village, the Nigeria construction industry is still experiencing a lot of complex and dynamic challenges coupled with its multi-cultural and multi-religious characteristics, which have affected effective communication processes between construction stakeholders and frustrate project delivery.

Therefore, the thrust of this study is to investigate the factors affecting effective communication during construction projects delivery amidst COVID-19 pandemic.

A visit to construction sites at Nnamdi Azikiwe University during the COVID-19 pandemic lockdown and border closures caused a major disruption to supply chains and had led to high rate of conflicts, delays in project delivery, decline in productivity and poor quality of conformance and performance. This brings to the fore the following questions;

i. Could it be that the project managers do possess effective communication skill for project delivery?

ii. If they do, how often do project managers apply effective communication skills in their project activities?

iii. Would effective communication management help on timely delivery of construction projects?

iv. Are there major factors affecting effective communication management in construction project delivery in Nnamdi Azikiwe University construction sites?

1.3 Objectives of the Study

The aim of this study is to examine communication factors for the management of construction project delivery amidst Corona Virus pandemic at Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi in Anambra State. The study has the following specific objectives:

1. To identify the major communication factors affecting managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

2. To analyse the extent of effect of drone technology for managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

3. To evaluate the influence of written communication in managing construction projects delivery amidst COVID-19 pandemic in Anambra.

4. To investigate the extent of effect of communication with a social medium on project delivery performance amid COVID-19 pandemic in Anambra State.

1.4 Research Questions

The following questions will be addressed.

1. What is the extent of availability of communication factors in managing construction projects delivery amidst COVID-19 pandemic in Anambra state?

2. To what extent does communication with drone technology important for managing construction projects delivery amidst COVID-19 pandemic in Anambra state?

3. To what extent does written communication influence managing construction projects delivery amidst COVID-19 pandemic in Anambra state?

4. To what extent does communication with a social medium affect project delivery performance amid COVID-19 pandemic in Anambra state?

1.5 Hypotheses.

Ho1: There are no significant communication factors in managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

Ho2: Communication with drone technology is not significantly important for managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

Ho3: Written communication does not significantly have influence in managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

Ho4: Communication with a social medium does not significantly improve performance in project delivery amid COVID-19 pandemic in Anambra state.

1.6 Justification of the Study

To effectively manage project stakeholders and resources for enhanced success requires effective communication management and anything short of this has proving drastic negative effect on the success level of most projects, especially, construction projects. COVID-19 pandemic has

however, worsened the situation based on the level social distancing which has affected face-to-face sharing of information.

The fate of most construction project survival appears to be threatened because of the COVID-19 outbreak which has affected social communication and interactions. This study is therefore justified as it seeks to investigate the role of communication management in the face of corona virus outbreak and its effect on construction project delivery.

This study will be important to construction project management stakeholders, policy makers and the general public as it will help educate and enlighten the various construction project stakeholders on strategic approaches for enhancing construction project communication, management and project quality and time performance especially during COVID-19 outbreak.

This study will also help to contribute to the existing body of knowledge and act as a reference resource for scholars and researchers in the field of construction project communication management on how to improve the quality of project delivery and time management through effective communication network especially during pandemics.

1.7 Scope of Study

The content and scope of this study are limited to examining the communication management factors for managing construction project delivery amidst corona virus pandemic.

The theoretical scope is limited to communication theories beyond sending and receiving massages. It embraces communication theories that cover the external influences and behaviours that affect communication process.

The geographical scope is the construction projects at NAUTH temporary and permanent sites, Nnewi, Anambra State. However, this case study will include construction projects being managed by both public and private construction project organisation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review

In all aspects of work life, the most common complaint about an organisation is poor or lack of communication. There is no argument in the fact that for a project manager to be successful, he/she must have a great communication skill. Project management communication is a skill that is never perfected, can always be improved and is pivotal in being able to initiate and mobilise a project effectively. However, the PMI (Project Management Institute, 2013) suggest that project managers should spend about 90% of their time communicating.

It has become glaring fact from various studies over the years that ineffective communication of project information is a reoccurring stumbling block in the process of construction project delivery. This is because project information in the indigenous Nigerian construction industry is commonly and extensively shared via traditional communication channels such as: face-to-face meetings, paperwork, phone calls, moving from office to office documentation etc., which has negatively affected the impact of effective communication and lowered the productivity of project stakeholders (Kolaci, 2014).

However, in this era of global crisis; the Corona Virus pandemic era (covid-19 pandemic era) has caused economic crisis and meltdown amongst other things because of the lockdown, hence human communications and interactions have been impeded (both goods and services). In a bid to survive this perilous economic time, the modus operandi of the world has changed drastically with the aid of information technology as the easiest means of doing business, rendering services, more prominently processing and managing resources, manpower and services without risk of loss of or threat to life, and human existence (effective communication). In summary, the world has changed methodology during this covid-19 pandemic epoch.

Human social distancing has given unabated relevance and use to the internet and social media. Everything now is online: e-conferencing, whatsApp (video, conferencing and chat groups), zoom meeting, phone conferencing, "skyping" etc. The Social Media and Enterprise Resource Planning (ERP) are gaining more grounds than the traditional communication channels. There are a lot of Software Applications (Apps) the world uses for project and business managements where the whole project team including stakeholders, users, suppliers, manufacturers etc., are networked exchanging and sharing all information. Some of them are designed to use intranet and not internet. The world has moved on with these and we are still having quite a lot of challenges in the country, so our economy may not easily bounce back should these continue unless we plan for them and brace up forthrightly. Moreover, this 'Information Technology -modus operandi' which is a problem today in this part of the world will eventually become the norm of our everyday life.

It is obvious that some project managers are very strong conservatives who find it extremely difficult to adapt to change. Furthermore, our system in Nigeria has not fully adapted to these changes by providing internet services readily in cities, not to talk of remote and rural areas. The Internet Service Providers (ISPs) in conjunction with our government have ripped off the citizens of the real value and services they ought to have provided. Therefore, the Nigerian citizenry spends so much money for these services which are not only epileptic but unavailable at high speed and broadband. This will escalate the actual cost of the project too.

Kolaci (2014) further argued that the activities and deliverables of a construction project will only be successfully delivered when vital information that may directly or indirectly affect both human and material resources are effectively communicated and managed using the contemporary information communication technology. As the business world continues to move towards becoming a global village, the Nigeria construction industry is still experiencing a lot of complex and dynamic challenges coupled with its multi-cultural and multi-religious characteristics, which

have affected effective communication processes between construction stakeholders. Despite the significant role of effective communication management in construction projects (Taleb et al., 2017) in their study highlighted that about 85% of project managers and stakeholders in developing economy such as Nigeria, Malaysia, Mali, Kenya etc., have not paid adequate attention to the roles and impact of effective communication during construction project execution hence the reasons for the high rate of conflicts, delays in project delivery, decline in productivity and poor quality of conformance and performance.

Consequently, a project team is generally quite a diverse group of people. Project teams are usually thrust together to deliver a unique benefit to an organisation, something new and different to the day to day activities undertaken. This diversity provides a further communication challenge for the project manager. Project leadership calls for clear communication about goals, responsibility, performance, expectations and feedback (PMI, 2013). Successful project management communication is about being there for everyone, being in touch with the real challenges of the project, understanding the real issues within the team who must deliver the project as well as understanding the issues of the sponsors who the team delivers the project for. Being present, visible and engaged with everyone is important – during the good times and the challenging times.

Communication is not only about speaking to and hearing from people, it is also about understanding the complete message. What language to use, how to convey the message with respect to tone, feeling and body language all play an important role in the communication process. If these are used incorrectly, the result is often a confused message and misunderstanding of the real issues and this is not healthy for project success as project objectives will not be understood by those involved in the process of realizing the project objectives (Kolaci, 2014).

Philips (2017) posited that a successful project manager can only maximize the effectiveness of communication within the team by being prepared to lead by example. According to him, a big part of leadership is to be present, and be prepared to communicate with all stakeholders at their respective levels. So, projects, especially, construction projects often fail because project managers simply fail to clearly articulate the goal and the project's success criteria. This goal or vision must be successfully communicated to each stakeholder and team member (PMI, 2013). In fact, the whole team should be able to visualize the end result, so as to work towards a common goal. Regular reporting of the project's progress and status is crucial to the success of the project. Communicating this to all stakeholders in a clear and precise manner is paramount, so that all understand what the key messages are. Diagrams, charts, graphs and tables should be properly applied to achieve this. This is because a picture is worth a thousand words, especially when communicating project progress.

2.1.1 Concept of Communication in Project Management

Communication is a critical factor for successful project delivery (Inloox, 2020). Communication therefore is key in project management, if success is to be achieved. So, for a successful project execution, effective communication to all stakeholders is essential. Many projects fail because of a lack of communication or an ineffective communication. However, communication is best defined as the exchange of information and the expression of ideas, thoughts and feelings by using words and other methods. In the project management context this means the exchange of knowledge, skills and experience (Rajkumar, 2010).

Project Communications Management therefore, includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information. Project managers spend most of their time communicating with team members and other project

stakeholders, whether they are internal (at all organizational levels) or external to the organization. Effective communication creates a bridge between diverse stakeholders who may have different cultural and organizational backgrounds, different levels of expertise, and different perspectives and interests, which impact or have an influence upon the project execution or outcome (George, 2016). So there are the three communication areas in project management according to Inloox, (2020):

a. Internal information exchange (decision-making process, conduction of meetings, daily scrums etc.).

b. Information management (relevant project information is communicated to all projects; changes to the project are communicated etc.).

c. Project marketing (project presentation and display to employees, customers, sponsors etc.).

However, it is very important that the project manager decides the communication strategy from the very beginning of a project. To do this, the following questions should be considered:

i. Does communication facilitate the achievement of goals and objectives?

ii. Who is the target audience of the communication and information transfer?

iii. Which communication channels should be used?

2.1.1.1 Project Communication Processes

George, (2016) identify three Project Communications

Management processes as follows:

a. Plan Communications Management—this process involves the development of an appropriate approach and plan for project communications based on stakeholder's information needs and requirements, and available organisational assets.

b. Manage Communications—this is the process of creating, collecting, distributing, storing, retrieving and the ultimate disposition of project information in accordance with the communications management plan.

c. Control Communications—this is the process of monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met.

Kliem (2018) posited that these processes interact with each other and with processes in other Knowledge Areas. The communication activities involved in these processes may often have many potential dimensions that need to be considered, including, but not limited to:

i. Internal (within the project) and external (customer, vendors, other projects, organisations, the public);
ii. Formal (reports, minutes, briefings) and informal (emails, memos, ad-hoc discussions);
iii. Vertical (up and down the organisation) and horizontal (with peers);
iv. Official (newsletters, annual report) and unofficial (off the record communications);
v. Written and oral, and verbal (voice inflections) and nonverbal (body language).

Most communication skills are common for both general management and project management . Therefore, PMI (2013), George (2016) and Phillips (2017), listed the following, but not limited to:

i. Listening actively and effectively;
ii. Questioning and probing ideas and situations to ensure better understanding.
iii. Educating to increase team's knowledge so that they can be more.
iv. Fact-finding to identify or confirm information;
v. Setting and managing expectations;
vi. Persuading a person, a team, or an organisation to perform an action;
vii. Motivating to provide encouragement or reassurance;
viii. Coaching to improve performance and achieve desired results;
ix. Negotiating to achieve mutually acceptable agreements between parties;

x. Resolving conflict to prevent disruptive impacts; and

xi. Summarizing, recapping, and identifying the next steps.

2.1.2 Methods of Project Communication

Different methods of communication exist in project management, but based on the organisational and geographical diversity of project teams, Hallows (2015) argued that it is important to consider all methods of communication. Today's enhanced technology allows project managers to communicate easily where ever the team members may be. A communication strategy should be conceived at the project planning stages, so the major issue to consider is its influence on the success of the project.

According to Hallows (2015), communication methods can either be active or passive. Active communication methods are those methods used to communicate instantly, for example the use of; Face-to Face meetings, Video conference, meeting – one on one, or group, Telephone conference, or voice only web conference, Webinars, becoming increasingly popular for the delivery of presentation based activities, Telephone – good old fashioned call, Stand up presentations in person.

While passive communication methods are those which recipients can adopt in their own time, for example: Pod cast, Web cast, Email, Intranet bulletin boards, Blogs, Website, Project newsletter – paper based, and Table top presentation.

To be successful, project managers should always ensure that a mix of active and passive methods of communication is used to complement each other. This should be considered as part of the overall project management communication strategy.

i. Listening

Active listening is arguably the biggest factor affecting effective communication. The communicator's body language can demonstrate clearly whether he/she is actively listening or

not. However, eye to eye contact is imperative to active listening. It shows that the listener is genuinely interested and engaged when someone is talking (Phillips, 2017).

Nevertheless, effective communication results in all involved in the project understanding what is being communicated. Phillips (2017) posited that this comes from spending time with the project team, being fully engaged and prepared to listen and understand the feelings which may be the key driver of the communication process. Project managers really need to have good communication skills to drive the project to become successful.

2.1.3 Effect of COVID-19 on Project Communication

Obviously changes are that most project personnel experience during coronavirus pandemic include; less face-to-face, in-person interaction with others, and when they are face-to-face, they are wearing masks. Levine (2020) said that we have less interaction overall with people outside of the people we live with, and we spend more time on Zoom, Skype and other mediated platforms. He further posits that, health-wise, social distancing is for the best overall; but social isolation is not healthy in the long term. The implication is that social distancing and or social isolation negatively affected construction project activities due to its dynamic and multi-interaction nature and characteristics.

There are some interesting and important researches on the effects of social isolation on communication. According to Levine, (2020) one impact is that, the less contact we have with other people, the more we become suspicious of other people. This can make others more defensive and lead to a vicious spiral where isolation leads to suspicion, which begets defensiveness, which reinforces the suspicion and leads to further isolation as a self-fulfilling prophesy. However, the benefit of isolation is that many project experts and staff are becoming better at using communication technologies, which may be more beneficial for construction

project activities in the long run. Yvonne (2020), however, guess that many of people have had crash courses in Zoom during the coronavirus quarantine. Levine (2020) said that much has been written on Zoom etiquette, such as turning off your microphone when you are not speaking. He suggests that Zoom happy hours or coffee breaks are a great idea. It is also very important to respect other people's comfort levels as well as their health. Following the basic rule of "be considerate" is probably more important than ever. With respect to construction project delivery, this rule will definitely have negative effect on project realization and economic development.

In order to maintain a sense of normalcy, Levine (2020) and Yvonne (2020) recommends keeping in touch with your friends and community as much as possible . This also extends to construction project staff and stakeholders. It is now very crucial to just keep in touch with project personnel/staff at all level whether by phone, email, text or old-fashioned letter. Getting back to normal will probably be a slow process, but it is also important to remember that what is normal, changes over time even without pandemics (Levine, 2020). Social and digital media are sure to remain important for the foreseeable future but they will not replace face-to-face interaction.

2.1.4 Justification for Communication in Project Management

It has been pointed out by Hallows (2015) that effective communication depends to a large extent on the verbal and non-verbal body language that transmits a message while relying on cues for feedback. There are five major reasons that justify the need for Communication in Project Management.

a. Transmitting or relaying information.

A project manager needs to ensure that the construction project team members and the stakeholders are informed of what he/she expects of them. Their roles and responsibilities and

other time constraints that prevent them from accomplishing the task as scheduled. It is also the project manager's task to keep them informed of project details and progress on time.

b. Receiving information.

Nutcache (2019) posited that in order to transmit information, it is a must that project managers regularly access the information for a given project. This is because at any time, there may be stakeholders who need information about the project such as the objectives, plan, risks, customer needs, and time constraints. Adherence to a system of regular and focused communication can prevent misunderstandings and delays that can cause failure in any project.

c. Change in situation.

All projects are fluid and the project manager needs to prepare for the challenges that he/she will face from the start until the project completion or end. To ensure effective communication throughout the whole project and team, Nutcache (2019) is of the view that a communication plan needs to be developed at the planning stage. The communication plan will contain the type of communication required during specific meetings, who needs to be communicated with, the frequency of communication needed, and the needs to be communicated.

d. Discussing project problems.

Based on the project problems, the fish bone diagram or Ishikawa diagram is essential in solving the causes for every problem. The importance of communication in project management cannot be overemphasized. Aside from the Ishikawa diagram, one can also discuss other topics through infographics, linear/bar graphs, pie chart, comics, etc. (Nutcache, 2019 and Phillips, 2017).

e. Bridging the language gap.

The language gap in project management lies in the distance that hinders understanding business benefits. The challenge of using language to deliver information that is often unclear and filled with project management jargon raises the importance of project communication.

So communication may imply being able to talk, speak and be listened to. It can also be called interaction. However, in project management, there is also a need for the project team to understand the long-term aim of the project so that they know how they have contributed to it and learn how they can make an impact.

Project success, therefore, depends on effective communication and this is the importance of communication in any project. It is believed that enhancing communication maximizes project success and minimizes risk or failure. Also, if a project manager can develop effective communication with its stakeholder; this may mean more projects for him and his team (Rajkumar, 2010).

2.1.5 The Major Obstacles in Project.

Communication Management in the Wave of Corona virus Pandemic There is a shift in communication in and outside of projects. This area of project management had to be adjusted immediately. It applies to both internal and external communication. For companies with little experience in remote work, it has almost become a revolution. The negative aspects are related to the loss of some informal chunks of communication about project context and nuances that are gained in ordinary coffee conversations (Cabala and Wawak, 2020). Many project managers will miss the face-to-face contact. They may also be more tired because online communication requires

more effort and concentration. Moreover, it takes longer to get consensus on some project issues and get everybody on the same page.

To understand the key communication obstacles or challenges that occur in the management of projects, especially construction projects, it is necessary to know the various interfaces any project may have. The interfaces, according to Kuga, (2016) may include:

a. Between organizations (e.g., customer-supplier);

b. Between departments within an organisation (e.g., marketing-IT, engineering-purchasing);

c. Between teams within a department (e.g., testers-developers); and

d. Within distributed teams (e.g., part of the team is in Seattle and the other in Sydney).

The main communication obstacles across the interfaces listed by Kuga, (2016) can be reduced to the following three broad areas:

i. **Political barriers:** Whenever there are many groups involved, thereis the possibility of vested interests and power games getting in the way of dialogue. Such political obstacles usually originate in the upper ranks of an organisational hierarchy, a step or two above levels at which projects are planned and executed. Wideman, (2001) suggests that in this situation, Project managers need to make special efforts to be aware of the key political players in the organisation. In traditional corporate environments, these might be functional or senior-level managers who are not always obvious project stakeholders. According to Wideman, once the political players have been identified, the project manager should take steps to gain their confidence and buy-in on project goals. This should help eliminate political barriers to project communications. It is best to settle political issues at the level where they originate; escalating political problems up the hierarchy (that is, to the manager's manager) generally does not help, and may even be counterproductive (Kuga, 2016).

ii. **Cultural barriers:** Organisational culture includes all the assumptions and values commonly held within an organisation that need to be resolved. Clearly, this can vary considerably between organisations; some may be more open than others. Communication at the interface between two

organisations with vastly differing cultures can be difficult. For example, one might expect some differences of opinion at a joint project planning session involving a very forward-looking, can-do supplier and a conservative, risk-averse customer. Project managers can minimize such problems by understanding the divergences in attitudes between the parties involved, and then acting as intermediaries to facilitate communication (Phillips, 2017 and Rajkumar, 2010). In geographically distributed (or virtual) teams, differences between regional cultures can come into play. These could manifest themselves in a variety of ways, such as differences in fluency of language or social attitudes and behaviours. Here again, the project leader, and the rest of the team for that matter, need to be aware of the differences and allow for them in project communications (Rajkumar, 2010).

iii. **Language barriers:** Linguistics need to be understood in the sense of specialized terminology used by different disciplines such as engineering, accounting, IT, marketing, etc. Often when specialists from diverse areas get together to discuss project related matters, there is a tendency for each side to make assumptions with respect to a common understanding of specialized jargon (Kuga, 2016). This often leads to incomplete or incorrect communication.

iv. **Technology:** the methods used to transfer information among project stakeholders can vary significantly (PMI, 2013). For example, a project team may use technology from brief conversation all the way through to extended meetings, or from simple written documents to material, (e.g. schedules and databases) that is accessible online as methods of communication.

So practical techniques that would solve the above obstacles needs to be identified and implemented. In other words, communication sharing should be best at any project stage.

2.1.6 Possible Ways of Overcoming Communication Obstacles through Communication Sharing.

There are many different ways a project manager and a project team can take to communicate. Project teams can effectively communicate through hallway meetings or formal project status meetings. Information can be transferred from stakeholder to stakeholder through anything from written notes to complex online databases and tracking systems (Binder, 2017). Global players with existing virtual teams hardly felt any change in managing projects during COVID-19 lockdown. The positive signals are that remote communication can work and that we learn quickly (Sonta, 2021).

However, Kliem (2018) posited that as part of the communications planning, the project manager should identify all of the required and approved methods of communicating. Some projects may be highly sensitive and contain classified information that not all stakeholders are privy to, while other projects may contain information that is open for anyone to explore. Whatever the case, the project manager should identify what requirements exist, if any, for the communication modalities.

According to Kliem (2018), communication modalities can also include meetings, reports, memos, e-mails, etc. The project manager should identify the preferred methods of communicating based on the condition of the message to be communicated. The following may have effects on the communication plan as pointed by (Rajkumar, 2010, Hallows, 2015, Binder, 2017 and Kliem, 2018):

i. **Urgency of the information:** When the information is communicated, it can be as vital as what is being communicated. For construction projects, information should be readily available, while other projects are less demanding.

ii. **Technology:** Based on the demands of the project, technology changes may be needed to fulfil the project request. For example, the project may require an internal website that details project progress. If such a website does not exist, time and money will need to be invested into this communication requirement.

iii. **Project staffing:** The project manager should evaluate the abilities of the project team to ascertain if appropriate levels of competency exist to fulfil the communication requirements or if training will be needed for the project team in order to cope.

iv. **Project duration:** The duration of the project can have an influence on the project technology. Advances in technology may replace a long-term project's communication model. A short-term project may not have the same technology requirements as a long-term project, but could benefit from the successful model a larger project uses.

v. **Project environment:** How a team communicates often depends on its structure. Consider a collocated team versus a virtual team. Each type can be effective, but there will be differing communication demands for each type of team.

Hence, the project manager may need to be in touch with people in the same location or various other locations in which project work is being performed. It is the project manager's duty to determine how to do this information sharing; he or she should categorize the means of communication. Information sharing in the current world makes us think of fax machines, telephone, e-mail, and similar tools (Kuga, 2016).

2.1.6.1 Prioritizing the Means of Communications

In order to prioritize the means of communications and convey what is really required, the following should be considered as posited by Shahatit (2016) and Kuga (2016);

a) **In person:** The best and common means of communication is still face-to-face. With this, the project manager can be able to ascertain the person's body language and get their tone and nuances. Very importantly, face-to-face communication often tells more about what is going on in the project.

b) **Telephone:** Using the telephone, the tone of the voice can be heard. Note that one should always smile into the telephone, which gives a feeling of upbeat and confidence in the project.

c) **Video conferencing:** This is very useful in saving travel costs and time.

d) **E-mail:** The most popular of these is obviously e-mail next to the telephone. It is surprising that people are taught how to use an e-mail system, but are not provided with any guidelines on effective use. However, there are some specific guidelines that would help to increase the efficiency of communication via e- mail, according to Kuga, (2016) and PMI (2008):

i. Avoid using email for any sensitive topics;
ii. Assume that everyone in the company will read your emails;
iii. Think about what medium to use for communications before you resort to email;
iv. Make sure that the title of the email is either very specific or very general; and
v. Avoid using email to discuss an issue in any depth. Email was never intended to be used as groupware.

e) Fax: This is not highly recommended in recent times, because it is not possible to confirm if the sent fax was received until the receiver confirms.

2.1.6.2 Key Competencies of Project Managers in COVID-Times and Beyond

As posited by Sonta (2021), the following strategies can be adopted by a Project Manager in the event of pandemic to overcome communication barriers and successfully deliver projects, especially, construction projects;

a. Communication skills in a virtual environment and fluency with technologies

b. Personal agility adaptability and quick reaction to changing environment

c. Resilience and stress management

d. Dealing with complexity and ability to select the most valuable information

e. Knowledge how to motivate people using empathy, emotional intelligence and being a "psychologist"

f. Leadership based on human values, sustainability values, and trust

2.1.7 Examining Communication Factors

According to Rajkumar, (2010), the most common type of communication between a sender and a receiver is verbal communication. When verbal communication is involved, the project manager should remember that half of communication is listening. It then means that the project manager must ensure that the receiver understands the message being sent. The confirmation of the sent message can be seen in the recipient's body language, feedback, and verbal confirmation of the sent message.

However, Hallows (2015) and Kliem (2018) identified five terms that are used to describe the process of communicating. They are as follows:

a. **Paralingual:** The pitch, tone, and inflections in the sender's voice affect the message being sent.

b. **Feedback:** The sender confirms that the receiver understands the message by directly asking for a response, questions for clarification, or other confirmation of the sent message.

c. **Active listening:** The receiver confirms that the message is being received through feedback, questions, prompts for clarity, and other signs of confirmation.

d. **Effective listening:** The receiver is involved in the listening experience by paying attention to visual clues from the speaker and paralingual characteristics and by asking relevant questions.

e. **Nonverbal:** Approximately 55% of communication is nonverbal. Facial expressions, hand gestures, and body language contribute to the message.

In the words of Rajkumar (2010), only 7% of our communication is verbal, the content of our communication. Thirty-eight percent is conveyed through the quality of voice, tone, volume, speed and pitch. Fifty-five percent is through posture, movements, gestures, facial expressions, breathing and skin-colour changes. So in this globalized world, communication between diverse groups is a major challenge. And the study finds it critical with respect to achieving success in construction project delivery, especially, the one under study.

2.1.8 Importance of Communication Management in Diverse Work Groups

Today's project teams or work forces reflect diverse backgrounds, experiences, and perspectives. However, while the term diverse includes a larger range of differences: economic level, educational level, lifestyle, sexual orientation, geographical and regional differences, plus many other descriptors. The presence and acknowledgment of these kinds of differences in people can help a work group communicate effectively and work productively (Kuga, 2016).

In the same vein, Rajkumar, (2010) maintained that communicating in diverse work groups is a business issue. Many organizations are realizing the value of different perspectives that come with a diverse work group. Diversity normally leads to more ideas and higher levels of creativity, giving the organisation more options and choices; and resulting in better outcomes for the organisation and better products and services for its customers. However, communication within a diverse work group can create complex and challenging situations. People with varying perspectives and experiences have different meanings and contexts for words and phrases. They also use nonverbal expressions differently. What is appropriate to one person may be offensive to another.

Successful communication in diverse work groups extends beyond mastering the mechanics of basic communication; it involves learning to understand and effectively use words and phrases. Effective communicators gain knowledge about other people's backgrounds and develop positive work group relationships (Rajkumar, 2010).

Amidst these challenges, it is important to determine how to communicate to achieve project success, especially, in construction project delivery.

2.1.8.1 Ways to Communicate to Achieve Success in a Project Team

i. Recognize and understand the differences

Understanding differences means acknowledging and respecting individuals for who they are; it does not necessarily imply agreement with their perspectives, nor is it a like/dislike dimension. The project manager needs to consider how he/she is different from the intended audience. This is because communication is a two-way process, and the project manager as the sender, plays an important role (Rajkumar, 2010, and Binder, 2017).

ii. Create the appropriate message to communicate

It is important to be clear about the content and goal of the message. To do this, the following questions must be considered according to Binder (2017); Are you communicating to inform? Asking for input? Clarifying an issue? Resolving a problem? How should your message be formulated given the differences between yourself and your audiences? Should your message be direct and to the point, or should it be more subtle and indirect?

iv. Deliver the message

At this point, the message can be delivered in different ways such as written document, a team meeting, voice mail, e-mail, or face-to-face communication. Each communication mode has its own advantages and disadvantages. Select the type that will maximize the successful delivery of the message given the diversity issues involved. Knowing the audience can greatly help determine when and how to deliver the message (Rajkumar, 2010).

v. Obtain the feedback

It is also important that the project manager checks for understanding and ensure that the message was accurately received. The major point is to ensure accurate comprehension, not necessarily agreement (Binder, 2017, Rajkumar, 2010).

Nevertheless, it will be erroneous to consider communication in project management without discussing Strategic Communication which is conveying the exact information to a specified target audience at the right time and through proper methods.

2.1.9 Strategic Communication Concept

Strategic Communication is not only the transmission of information from the resource to the receiver but also a simultaneous dialogue, ongoing mutually between the participants (Corman, 2010). Even the communications themselves cannot be simplified as transferring a message between two individuals or groups; on the contrary, it is an arrangement of a quite complex communication system between the resource and the receiver (Corman, Trethewey and Goodall, 2007). In this context, the basic principles of the communication should be well comprehended in order to have a better understanding of Strategic Communication. For this purpose, explaining a few communication models will be just to the point. The purpose of providing space for conventional communication models is to clarify and interpret the experienced communication processes, to put the elements of communication into place within the configuration process of the message, to explain how the message reaches the receiver in a most effective way, and to ensure how the Strategic Communication model and process can be better understood (Knoop, 2016).

Several definitions have been offered for communication, which has been the crucial part of the life since the existence of humankind. Finding a common ground in these definitions of communication, Demiray (2011) calls communication the mutual exchange of information and understanding through effective instruments depending on the content of this information. When the conventional communication models used in the communication process are examined, it will be clear that communication is based on the principle of conveying, by the resource, any

information through a coded message to a single receiver by means of a conduit resistant to external factors. The major problem with these models is the message-composing and message-conveying capabilities of the resource which produce the message, plus the misperception of the message due to interference and noise in the system. According to Corman (2010), repetition of the message could prevent communication failures; however, such features of the message as reliability, criticality and urgency may cause a failure to achieve the desired communicative goals. Furthermore, communication is realized in today's complex and dynamic communication environment as "simultaneous dialogue" ongoing mutually between the participants, instead of conveying the messages from the resource to the receiver (Corman, 2010). Structural changes towards a communication process managed by mutual dialogues are needed rather than a communication environment which prescribes waiting for how society or target audience perceives a one-sided notification. However, communication would be healthier if the resource perception and priorities of the audience that the resource will address conform to each other.

2.2 Theoretical Framework

Early theoretical models of communication from the 60's simply saw communication process as an exchange of message from a sender to a receiver with a lot of importance given to the sender and the channel used for the transmission (Singh, 2012). Since the 70's the model has undergone a 180 degree shift with more emphasis given to the communication process itself, seen primarily as an exchange.

Much of the work in communication for project development focuses on two main areas of application: first, information dissemination and motivation and secondly, training of field workers and rural dwellers (Diego, 2014). Both areas assume essential conditions particularly audience involvement. Successful construction projects can only be realized unless knowledge and technologies are shared effectively and the stakeholders involved in the process are motivated to achieve success in project implementation under any circumstance.

2.2.1 Niklas Luhmann's Communication Theory

The Pragmatic Complexity Communication Model (PCOM), developed by Steven Corman, Angela Trethewey and Bud Goodall in 2007, (Figure 2.1) is regarded as a useful communication model to analyze successful and unsuccessful uses of Communication (Sherkey, 2009). The PCOM indicates that communication is not as simple as the transfer of a message between two groups; on the contrary, it is an arrangement of a quite complex communication system between the resource and the receiver (Tatham, 2010). The PCOM was designed by inspiration from Niklas Luhmann"s communication theory. According to Corman, Trethewey and Godall (2007), communication is not an activity of sending a message from one mind to another. Communication is a characteristic of a complex system wherein participants interpret each other's attitude and behaviours; they evaluate the intention, thought and motivations behind these attitude and behaviours. The system is complex because of a double contingency that involves the participants.

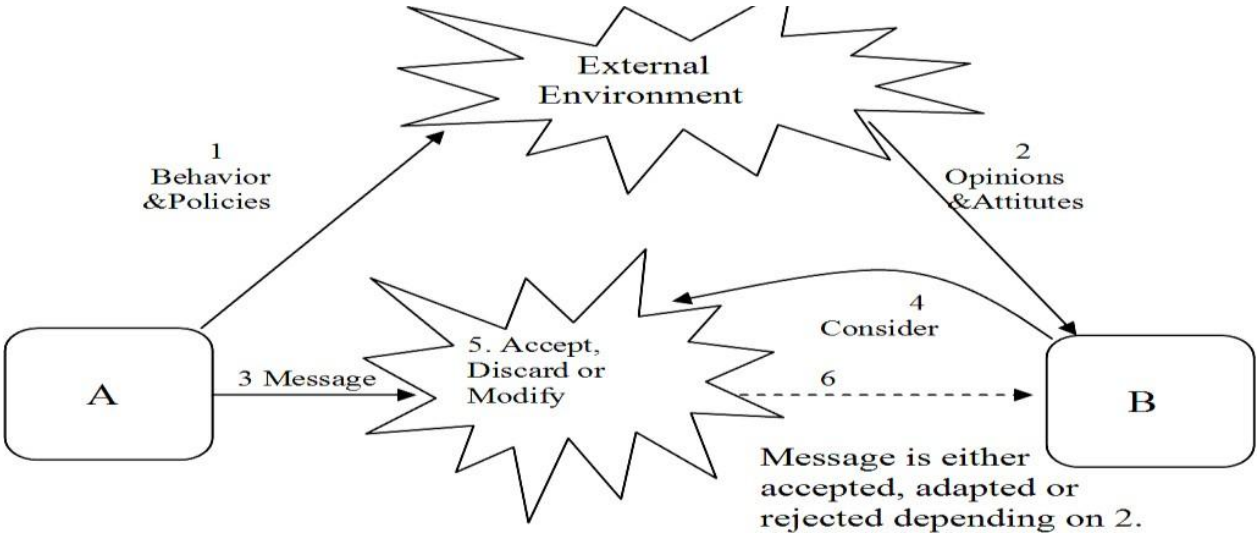

Figure 2.1. The Pragmatic Complexity Model

Source: Tatham, 2010.

The PCOM assumes that the messages are interpreted within a huge communication system; therefore, A and B have a reciprocal and simultaneous relationship of dependence. According to

the model, in the simplest case of a communication system with two participants A and B, the success of the resource A and its message is dependent not only upon the message conveyed and external conditions, but also on what the receiver B thinks and does. The thoughts and actions of B are influenced by the attitude and behaviours of A as well as the expectations, thoughts and interpretations of B about A. The success of the messages of A is dependent upon the external environment and upon how B perceives A's role in this environment (Tatham, 2010).

From this theory, the external environment and behaviour can be influenced by the outbreak of pandemic like COVID-19 which affects the behaviour of a personnel based on the knowledge and fear of contracting the virus. Hence, these can affect construction project performance. Therefore, this study is based on Niklas Luhmann's Communication Theory, because it considers the influence of external environmental factors on communication effectiveness.

2.2.2 Taylor's Communication Theory

Based on the theory according to Taylor (2008), that effective communication provides guidance in determining a "road map" for the implementation of corporate policies. This enables determining what to say in messages to be shared with the public and provides a vision with a more powerful corporate reputation through the knowledge of what, why and how, instead of gropingly and randomly conducted communication campaigns.

2.3 Empirical Study

In this empirical review, many related authors were studied as reported. Mavuso and Agumba, (2016) studied Factors of communication management for successful project delivery in the Swaziland construction industry. The aim was to identify the communication management factors that influence project success; and propose a conceptual improvement model to enhance communication- management practice for successful project delivery in the Swaziland construction industry. Thematic analysis was used to extract the themes, which were tabulated in a matrix. Eight communication management factors were identified that were observed to

influence project success; and a hypothetical communication management improvement model has also been proposed. The variables were: Technology and systems, communication skills or competence, communication plans, teamwork and partnering, organisational structure, stakeholders' frame of references, project briefing and the context of an environment.

Nazia et al, (2016) on their work on critical factors influencing the project success: an analysis of projects in manufacturing and construction in Pakistan noted that effective and efficient management of critical success factors is the basic requirement of project success. The study comprised of a sample from which data was collected was 155 respondents through a pre-structured questionnaire. The collected was subjected to reliability test, descriptive analysis, correlation analysis and regression analysis by using the SPSS software. The findings of this study show that both critical success factors and project success have very close and significant relationship with each other. Critical success factors have significant impact on project success in construction and manufacturing industries in Punjab.

Also, Hedieh, Shakeri and Mohammad studied Analysis of factors affecting project communications with a hybrid DEMATEL-ISM approach (A case study in Iran). According to them, One of the main factors in the success of projects is communications management and proper and timely distribution of information among all internal and external project stakeholders. Their research aimed to identifying and determining sequences and relationships factors affecting project communications and their clustering. The informed communication strategy allows managers to structure the information flow in a better and more controlled manner and to avoid the costs caused by lack of effective and timely communication. They identified a number of factors influencing project communications in oil, gas and power plant construction megaprojects in Iran and were analyzed by using the combination of fuzzy DEMATEL and Interpretive Structural Modeling (ISM) techniques.

Kitachit (2019) conducted a study on effective communication in public building projects in Guyana. He argues that poor communication strategy have become a regular feature of most public building sector projects. The average cost overrun found in his study is 82% and this was attributed to wrong method of communication transmission. However, Kitachit (2019) concludes that about 20 - 25% can be attributed to inability to understand and support the effort of development agencies, and the remaining 70-75% has to be explained in terms of real factors, such as literacy level, and cost of communication. He gives the following main factors as the causes of public building project failure and abandonment: language barrier, low level of formal education, cost associated with effective communication, poor method of communication, organizational politics, cultural background, inadequate funding of projects, bureaucratic indecision, and a lack of coordination between project coordinator and the workforce. The t-test result shows that all the factors show high level of significance to building construction projects.

Language barrier is the main factor that affects communication in building construction projects in Guyana and other South America countries. But he did not consider the collective - effects of the factors on the selected projects.

Study by Liu (2014) examined communication related issues in Korean social construction projects. The objectives are to identify the major communication factors that constrain the realization of capital projects; to analyse the factors to determine the level of significance of the factors to the projects and to ascertain the major factor for management decisions. Based on 67 completed projects, he identified the causes of poor communication in construction projects and grouped them into major categories: changes in scope, political divide, language barriers, poverty level and adjustment of project costs, and no practical use of the standard method of communication and earned value management system. Using discriminant analysis method, the research found that political divide, language barriers, lack of standard method of communication are significant discriminants to successful construction projects, whereas lack of standard

communication method is the major factor to consider in achieving effective communication for construction projects in Korea and other neighbouring countries. However, the effect of pandemic was not considered in the study and the collective impact of the factors was not also considered.

However, some authors have made several researches concerning the problem of effective communication in the implementation of construction projects in Nigeria. The study of Ikonne (2014) identified communication factors that cause failure of development projects, these factors were then categorized in five categories namely: environmental factors, construction factors, and social factors, socio-economic factors such as poverty and illiteracy level and financing factors. Chikwe (2015) revealed that increase in poverty, wrong method of communication, distance between the project manager and the construction site, poor training and development, high cost of communication, poor network availability are paramount to the Nigerian experience. Analysis with Chisquare shows that the identified factors are significant to communication management for successful project management and that wrong method of communication is most critical to project management in Nigeria and other developing countries of West Africa. Also the collective effects of the factors were not ascertained by the researcher.

Another related study by Ugwu, (2018) on the analysis of key challenging factors of communication in the delivery of development projects in Edo State, Nigeria revealed the following; that some of the contractors of development projects were dubious and abandoned their contracts without informing their clients. They also manipulated the community members who were largely illiterates in the course of the projects to purchase and install inferior materials (Ugwu, 2018). It was also found out that some educated and influential men in the communities hijacked the project(s) and manipulated same to suit their interests, while the less influential majority were left out of the decision making processes. This again engendered lack of interest by those that were left out. He further explained that political affiliations created power centres in the

villages/communities. Communication decisions related to the management of projects were in most cases influenced by these power centres, making it difficult for other villages to voice their needs and opinions. This hindered effective communication and monitoring, as those excluded were not willing to participate in the project realisation. Other challenges to the projects included poor data gathering and information management by community members because of illiteracy, poverty level, poor attitude, inadequate logistics and difficult terrain of some communities.

Eze, (2017) studied the role of strategic communication in the successful execution of road construction projects in the South East geopolitical zone of Nigeria. His study objectives include to ascertain the level of relationship between strategic communication and road construction projects in the zone and to identify the factors that hinder strategic communication roles in the implementation of road construction projects in the Southeast states of Nigeria. The study identified four major factors which include political factors, cultural factors and language factors, cost of communication. After analysis with Pearson's correlation and Analysis of variance, the result show that there is significant relationship between strategic communication and road construction projects and that political, cultural and language factors are significant factors that affect the roles of strategic communication in the implementation of road construction projects in the South east geopolitical zone of Nigeria. But the study also did not delve into the collective effects of the factors and the effect of disease outbreak on strategic communication in the planning and implementation of road construction projects in the zone.

In conclusion, communication if effectively used has the potential to facilitate successful implementation of projects.

2.4 Research Gap

From the review, communication has played great role in ensuring effective implementation of construction projects around the World. Also a lot of communication related factors have been found to be critical to effective communication for successful project delivery. The study discovered that all the authors discussed failed to determine the collective effects of communication on project delivery. Also none of the studies discussed the effects of pandemic or disease outbreak on communication during construction project delivery. This study seeks to close these gaps for improved project delivery and economic development. There was no communication factors during COVID-19 pandemic in the construction industry which the present study proposed to study.

Table 2.1 Content Analysis

Authors	**Identified communication factors**
Kitachit (2019)	Language barrier, low level of formal education, poor method of communication, organizational politics, cultural background, inadequate funding of projects, bureaucratic indecision, cost associated with effective communication and a lack of coordination between Project coordinator and the workforce.
Liu(2014)	Changes in scope, political divide, language barriers, poverty level and adjustment of project costs, and no practical use of the standard method of communication and earned value management system.
Ikonne(2014)	Environmental factors, construction factors, and social factors, socio-economic factors such as poverty and Illiteracy level and financing factors
Chikwe(2015)	Increase in the level of poverty, wrong method of communication, high cost of communication, distance between the project manager and the construction site, Poor training and development, poor network availability.

Ugwu,(2018)	Contractors of development projects were dubious and abandoned their contracts without informing their clients, educated and influential men in the communities hijacked, poor data gathering and information management by community members because of illiteracy, poverty level, poor attitude, inadequate logistics And difficult terrain of some communities
Eze,(2017)	Political factors, cultural factors and language factors, Cost of communication

Source: Researcher's design, 2021

Based on the literature review and content analysis in Table 2.1, the study identified the following communication factors as critical for managing delivery of Nnamdi Azikiwe University Teaching Hospital permanent and temporary sites, Nnewi (hospital construction projects) in Anambra State; communication method, language barriers, political divide, literacy level of workforce, and associated cost of communication.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

Research design is used to describe how variables of the research will be observed and controlled to generate necessary primary data for the study. Hence, the descriptive survey design was adopted for this study. The approach stated the problem of study and set objectives. It then focuses on a population which involves the collection of data from the specified sample of population for study and analysis. Based on the analysis, conclusions and recommendations were drawn. It also affords the researcher the opportunity to visit the project sites in the area of study. Hence, this technique was designed to be descriptive and inferential.

3.2 Population of the Study

The population of this study was estimated at one hundred and twenty (120). They include the Project Managers (6), Architects (9), Quantity Surveyors (9), Civil Engineers (9), Structural Engineers

(9), Electrical Engineers (9), Service Engineers (9), Contractors (6), and Site Workers/Artisans (54) who were directly involved in the planning and implementation process of the nine (9) NAUTH construction projects in Nnewi, Anambra State. Due to perceived difficulty in accessing the population, the study decided to conduct sampling to reduce it to a manageable size.

3.2.1 Sampling Procedure

With the aid of Yaro Yamane sample size formula,

$$n = \frac{N}{(1+Ne^2)} \quad \text{.....3.1}$$

In the above formula, n is the sample size, N is the population size, while e is the allowable error margin(5%).

Hence, n= 120/(1+120(0.05^2))= 92.

The study sampled ninety two (92) respondents base on judgmental sampling technique as they were perceived to have direct knowledge of the communication related factors in the planning and implementation of NAUTH construction projects in Nnewi, Anambra State, Nigeria.

3.3 Method of Data Collection

There are various methods of data collection. However, two main sources of data collection techniques where used. Primary and secondary data were used considering the nature of problem and direction of the study.

3.3.1 Source of Primary Data

The primary method of collecting data adopted for research is designing and administration of questionnaire to the selected respondents. The questionnaire contained well-structured statements/questions designed to capture the relevant data needed for the study. Likert's five point scale was used to design the questionnaire. Five statements were made on each of the identified communication factors. This was done to allow the respondents to express their level of agreement or disagreement regarding the pre-determined communication related factors for construction project delivery. The respondents were required to mark (X) on the appropriate answer from the range of options provided for each question using 5 point Likert scale.

Likert (1932) developed the principle of measuring attitudes by asking people to respond to a series of statements about a topic, in terms of the extent to which they agree with them, and so tapping into the cognitive and affective components of attitudes. Likert-type or frequency scales use fixed choice response formats and are designed to measure attitudes or opinions (Kothari, 2002, Bowling, 1997; Burns, & Grove, 1997). These ordinal scales measure levels of agreement/disagreement.

A Likert-type scale assumes that the strength/intensity of experience is linear, i.e. on a continuum from strongly agree to strongly disagree, and makes the assumption that attitudes can be measured. Respondents may be offered a choice of five to seven or even nine pre-coded responses with the neutral point being neither agree nor disagree.

In its final form, the Likert Scale is a five (or seven) point scale which is used to allow the individual to express how much they agree or disagree with a particular statement.

- Strongly Agree=5
- Agree= 4
- Undecided=3
- Disagree=2
- Strongly Disagree=1

3.3.2 Sources of Secondary Data

The sources of secondary data collection consist of journals, internet, textbooks, all aspects of literature review, past documentations on communication management and project management, etc.

3.4 Reliability Test of the Research

Several methods of ascertaining reliability of data exist, but for the purpose of this study, the test-retest method was adopted after the instrument has been retrieved from the sample used for the pilot study. Hence, the research instrument was administered to a certain group of the respondents, the results were collected and after three months, the same instrument was also administered to the same respondent group. Then Pearson correlation analysis was adopted to correlate the two collected data. The results showed a correlation (r- value) of 0.94, which implies that the research instrument (questionnaire) is a reliable instrument for collecting data for analytical purposes.

3.5 Administration of Questionnaire

The questionnaires were delivered by hand to the various target groups and the researcher distributed 92 copies in the study area based on judgmental sampling, since they were involved in the selected projects. Table 3.1 shows the 55 distribution statistics of the questionnaire to the selected respondents;

Table 3.1 Questionnaire Distribution to Respondent

S/No.	Nature of the Respondents	Number of questionnaire Distributed
a	Project Managers	7
b	Architects	7
c	Quantity Surveyors	8
d	Engineers (civil, structural, electrical, service)	23
e	Contractors	7
f	Site Workers/Artisans	40
	Total	**92**

Source: Researcher's Design, 2021

3.5.1 Instrumentation

The effective communication for project delivery in pandemic Questionnaire was used for collecting responses from the subjects selected for the study. The questionnaire was developed by the researcher based on ideas obtained from the work of the questionnaire used for the study consisted of five component parts.

The first parts consist of questions that made it possible for the bio-data to be collected. This part of the questionnaire was intended to elicit information about the sex, age, and working category and employment duration of the respondents.

The other part of the questionnaire that contained the dependent variables which dealt with familiarity of the research concept was designed to elicit responses from respondents on familiarity dimension and to find out the extent to which this affects their project delivery.

3.6 Instrument Scoring Scale

The scale of response on the questionnaire was from strongly Agree, Agree, Undecided, Disagree to Strongly Disagree. The calibrations for the positive items were such that they were scored: 5, 4. 3. 2 and 1. The negatively structured items were scored as follows: 1, 2, 3, 4, and 5. The different communication factors were aggregate and the total for each communication factor was found. Items on the dependent variables (work approach) were also aggregated and the total computed.

3.7 Validity and Reliability

(A) Content Validity

In order to ensure that the instrument measures exactly what it is intended to measure, experts in this area of study were as the pre-test judges. Their expertise was brought to bear the questions were relevant, clear and unambiguous. Furthermore, it was to ensure that the questions had covered all the dimensions of the variables included in the study. The experts approved the questionnaire used in the study after some modification.

(B) Reliability Test

The reliability of the instrument was determined by the responses obtained from 10 respondents who were members of staff of the company. These 10 respondents were randomly selected. Since 87 respondents making up 96% of the population of the organisation was used for the study, the initial 10 respondents who were used for the pre-test were excluded in the sampling of the 87 respondents used finally for the study.

The split-half method was employed for the reliability test and the correlation coefficient was established at 0.79. Dividing the questions on the questionnaire into two halves did the split-half analysis. The odd numbered items were used on the one hand and the even numbered items on the other.

The correlation was done using the data obtained from the odd and even numbered items. The obtained value of 0.79 was then taken as a satisfactory level of reliability, after the correlation coefficient was stepped up to 0.79 using the spearman-Brown formula.

3.8 Pre-Testing of the Questionnaire

Pre-test was carried out to see how the questionnaire would work out and whether changes were necessary before the start of the full-scale study. It afforded me the opportunity of foreseeing the language problem in the questionnaire for the junior grade and therefore led to the modification in language as well as the provision for interpreters to administer the questionnaires when it was finally administered. The people used for the pre-test exercise were similar in grade and characteristics to those who were eventually sampled in the final study.

3 .9 Administration of Questionnaire

A total of 87 respondents completed and returned the questionnaire.

The questionnaires collected from the respondents were used for the analysis.

3.10 Technique of Data Analysis

3.10.1 Principle Components Analysis and Factor

Analysis Principal Component and Factor analysis are related techniques that can be used to replace one group of variables with another. One reason a researcher may want to do this to reduce number variables being studied.

The main purpose of a Principal Components Analysis is to recognize a data set so as to produce orthogonal variables. The mean variables of each will contain both common variance and unique variance. Common variance is that part of variables pattern which is

related to the other variables in the system. Its unique variance is the residual from the multiple relationships.

The confusion that can be caused by the mixture of common and unique variances in a principal component is excluded by using factor analysis. Factor analysis focuses only on the common variance and weight variables according to their inter relationship with the others.

Identification of uncorrelated factors is made possible usually by axial rotation of the vectors making up the data a set. Rotation may be done using anyone of a number of methods but commonly by orthogonal rotation (Johnston, 1978).

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Presentation of Analytical Results

The results obtained from the analyses made with the collected data were showcased in the following tables.

4.1.1 Analysis of the Questionnaire

Administered Questionnaire distributed and retrieved from the selected respondents were shown in Table 4.1;

Table 4.1 Administration and Retrieval of the Research Instrument

S/No.	Nature of the Respondents	Number of questionnaire Distributed
A	Project Managers	7
B	Architects	7
C	Quantity Surveyors	8
D	Engineers(civil, structural, electrical, service)	20
E	Contractors	7
F	Site Workers/Artisans	38
	Total	**87**

Source: Researcher's Design, 2021

The researcher distributed a total of ninety two (92) questionnaires to the selected respondents for assessment in the area of study. During questionnaire collection, eighty nine (89) were collected out of which two (2) were not properly completed and as a result were discarded. So, eighty seven (87) were seen to be free of errors and were used for analysis. These represent 94.6% of the total responde nts hence implying good response rate.

4.1.2 Bio-Data of the Respondents

The survey results were processed within SPSS (Special Package for Social Sciences) system by coding the data and formatting them.

Table 4.2: Staff Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Female	38	43.0	43.0	43.0
Male	49	57.0	57.0	100.0
Total	87	100.0	100.0	

Source: Output from SPSS V18

Table 4.2 shows the staff gender as respondents. The female population represents 43%, while the male population represents 57%

Table 4.3 Age of Staff

	Frequency	Percent	Valid Percent	Cumulative Percent
	19-24	16	19.0	19.0
	25-30	32	36.8	36.8
	31-36	33	38.2	38.2
	37-41	5	5.6	5.6
	Above 41	1	.4	.4
	Total	87	100.0	100.0

Source: Output from SPSS V18

The age distribution of the staff interviewed shows that (0.4%). reported that they were above 41 years old and majority (75%) were aged 25-36 years. The proportion of young adults was expectedly low (19.0%) showing that quite some length of time is required to acquire the expertise to work in the industry.

Table 4.4: Qualification

	Frequency	Percent	Valid Percent	Cumulative Percent
Bsc/HND	66	77.2	77.2	77.2
MBA	2	2.6	2.6	79.8
OND	10	12.6	12.6	92.4
WAEC/SSCE	6	7.6	7.6	100.0
Total	87	100.0	100.0	

Source: Output from SPSS V18

The educational background reported was quite interesting, suggesting that 7.72 had basic education, while remaining personnel interviewed had tertiary education in conformity with high skilled labour requirement.

Table 4.5: Staff Category

	Frequency	Percent	Valid Percent	Cumulative Percent
Contract	3	2.2	2.2	2.2
Junior	49	57.0	57.0	59.2
Mgt	2	1.6	1.6	60.8
Senior	34	39.2	39.2	100.0
Total	87	100.0	100.0	

Source: Output from SPSS V18

Table 4.5 shows the category of staff sampled. I t reveals that 2.2% were on contract, 57% were junior staff, while 1.6% were management staff and 39.2% were senior staff. This further reveals that the junior staff had higher representation in the sampling process followed by the Senior Staff.

4.2 Test of Reliability of Study Data

Reliability refers to the consistency, stability of data collection instruction. A reliable instrument does not respond to chance factors or environmental conditions; it will have consistence results if repeated overtime or if used by two different investigator.

4.6 Reliability Statistics

Cronbach's Alpha	N of Items
.710	20

Source: Output from SPSS V18

Reliability refers to the consistency, stability, of data collection instruction. A reliable instrument does not respond to chance factors or environmental conditions; it will have consistence results if repeated overtime or if used by two different investigators.

Cronbach's was used as an examination indicator to determine the reliability of the measurement scale. The value of Cronbach's alpha is generally required to be over 0.7 and the calculated results were over 0.710 in the variables. The figures representing as the output 63 of research survey, it was observed that the reliability of all the twenty variables in the research sample, in terms of Cronbach's alpha, was greater than 0.7. This meant that the research measurement scale, applied in this study, was reliable.

Table 4.7 Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Communication is important in project management.	4.6995	.45975	87
It is vital that the project managers communicate with Staff.	3.7432	.92857	87
Workers put in their best when there is effective oral and visual communication.	2.0328	1.12368	87
Drone technology is the best communication tool for project in COVID-19 era.	3.8798	1.02538	87
Effective communication makes staffs have a positive attitude towards work.	4.3716	.72904	87
Project delivery should be a paramount issue of concern to top management.	4.6667	.47270	87
Oral communication is vital if projects must be delivered during COVID-19 pandemic	3.9126	1.05508	87
Even without proper communication, some projects would	2.5956	1.25811	87

be delivered.			
Projects will be delivered if unwritten communication are employed	1.6448	.91361	87
Telephone conversation are can enhance better communication during lockdown	4.2732	.69669	87
Zoom and Skype communication methods are effective ways of communication delivery	4.2842	.70017	87
communication on WhatsApp is key for project delivery management during pandemic.	1.9180	1.16678	87
The use of drone technology should be encouraged for enhanced communication	4.8962	.30587	87
Communication facilities are important in every organisation.	3.9945	.46288	87
Oral communication on the part of the CEO/MD can contribute to much productivity	1.6448	.91361	87
There should be special COVID-19 communication facilities for project delivery	4.8525	.35562	87
Covid-19 enforcement agent could disseminate prompt information during constructions	4.5902	.49315	87
Projects are delivered promptly during COVID-19 lockdown when E-conferencing is used for communication	4.8962	.30587	87
Face to face communication reduces project delivery duration during covid	4.2842	.77468	87
Video call is the best method of communication for project delivery	3.3169	.94815	87

Source: Output from SPSS V18

The summary of the description of the entire variables posed in the study is presented in the table 4.7, with the mean and standard deviations of the variables resulting from the survey on effective communication during COVID-19 lockdown in the construction industry. On the whole, about 14 of the variables recorded mean values greater than 3.0, corresponding

approximately to the 14 variables with highest scores in the factor analysis along with associated factors which scored in excess of 0.500.

Table 4.8 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.491
Bartlett's Test of Sphericity	Approx. Chi-Square	1206.821
	Df	18
	Sig.	.000

Source: SPSS Iterations from version 18

Bartlett's test is used to test if k samples are from populations with equal variance. Equal variances across populations are called homoscedasicity or homogeneity of variances. Some statistical tests, for example the analysis of variance, assume that variances are equal across groups or samples. The Bartlett test can be used to verify that assumption.

Bartlett's test is sensitive to departures from normality. That is, if the samples come from non-normal distributions, then Bartlett's test may simply be testing for non-normality.

The Bartlett's test conducted proved to be statistically significant (Sig-value=0.000< 0.001). The Kaiser-Meyer-Olkin (KMO) measure was approximately 0.491, indicating the data were sufficient for principal component analysis (PCA). The Bartlett's test of sphericity X2 = 1206.821 (Chi-square), P< 0.001 showed that there were patterned relationships between the variables. Because the chi-square of 1206.821 for company studied with 18 degree of freedom are unlikely to have arisen by chance, the 87 staff of the company interviewed do not have equal opinion on the subject matter imperatives.

4.3 Exploratory Factor Analysis of Effective Communication in Managing Project Delivery in Construction Company during Pandemic

To achieve some reduction in the categorical data points to deal with, while also investigating the structure of the data, we carried out an exploratory factor analysis. It was

hoped that the analysis would also serve the purpose of streamlining the study by removing highly correlated variables from the data set. The Principal Component Analysis (PCA) was the extraction method used under the IBM SPSS V20.0 system. As it turned out, the result of the PCA (Principal Component Analysis) seemed somewhat reasonable in the absence of a clear idea of the nature of the distribution of the company personnel interviewed in the study. The numbers of components retained following the analysis were five.

The data structure suggests that there are twenty principal components of the factors in the analysis. These factors were retained for rotation following the varimax (orthogonal) rotation function of the PCA which selects for all factors with Eigen values greater than 1.0.

While this may not be the most accurate method for selecting the number of factors to retain, a careful inspection of the Scree plot (see figure 4.1) shows that some confidence can be place on the number of factors selected and that there is probably no over extraction or under-extraction of factors retained.

It is clear that the five components represent the underlying structure of the factors used in the study with a cumulative variance of 90.180% in the original variables, with only 9.9% loss of information.

Table 4.9 Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.952	29.760	29.760	5.952	29.760	29.760	5.140	25.702	25.702
2	3.794	18.971	48.731	3.794	18.971	48.731	4.181	20.906	46.607
3	3.427	17.137	65.868	3.427	17.137	65.868	3.573	17.865	64.472
4	2.748	13.740	79.608	2.748	13.740	79.608	2.697	13.487	77.959
5	2.114	10.572	90.180	2.114	10.572	90.180	2.444	12.22	90.180

								1	
6	.996	4.981	95.160						
7	.756	3.782	98.942						
8	.195	.975	99.917						
9	.017	.083	100.000						
10	2.490E-015	1.245E-014	100.000						
11	1.177E-015	5.886E-015	100.000						
12	1.060E-015	5.298E-015	100.000						
13	3.938E-016	1.969E-015	100.000						
14	1.975E-016	9.874E-016	100.000						
15	2.600E-017	1.300E-016	100.000						
16	-5.322E-016	-2.661E-015	100.000						
17	-8.464E-016	-4.232E-015	100.000						
18	-1.942E-015	-9.710E-015	100.000						
19	-2.291E-015	-1.146E-014	100.000						
20	-3.217E-015	-1.609E-014	100.000						

Source: Extraction Method from Principal Component Analysis with SPSS V18

Table 4.9 shows the principle component analysis which reveals the Eigen values of the factors used in the sample. It further shows the cumulative percentages and variance of the factors which were prominent in the analysis.

Table 4.10 Communalities

	Initial	Extraction
Written communication is very important in project management.	1.000	.920
It is vital that the project managers communicate with Staff.	1.000	.776
Workers put in their best when there is effective oral and visual communication.	1.000	.969
Drone technology is the best communication tool for project in COVID-19 era.	1.000	.961
Effective communication makes staffs have a positive attitude towards work.	1.000	.768
Project delivery should be a paramount issue of concern to top management.	1.000	.885
Oral communication is vital if projects must be delivered during COVID-19 pandemic	1.000	.947
Even without proper communication, some projects would be delivered.	1.000	.963
Projects will be delivered if unwritten communication are employed	1.000	.856
Telephone conversation are can enhance better communication during lockdown	1.000	.954
Zoom and Skype communication methods are effective ways of communication delivery	1.000	.939
communication on WhatsApp is key for project delivery management during pandemic.	1.000	.823
The use of drone technology should be encouraged for enhanced communication	1.000	.676
Communication facilities are important in every organisation.	1.000	.980
Oral communication on the part of the CEO/MD can contribute to much productivity	1.000	.856
There should be special COVID-19 communication facilities for project delivery	1.000	.989

Covid-19 enforcement agent could disseminate prompt information during constructions	1.000	.974
Projects are delivered promptly during COVID-19 lockdown when E-conferencing is used for communication	1.000	.865
Face to face communication reduces project delivery duration during covid	1.000	.944
Video call is the best method of communication for project delivery	1.000	.990

Source: SPSS V18 Output

Table 4.10 reveals the communalities of the questions raised under each of the factors sampled. It shows the extent to which the questions reveal the perception of the respondents to the key factors common to project evaluation time amid the COVID-19 pandemic.

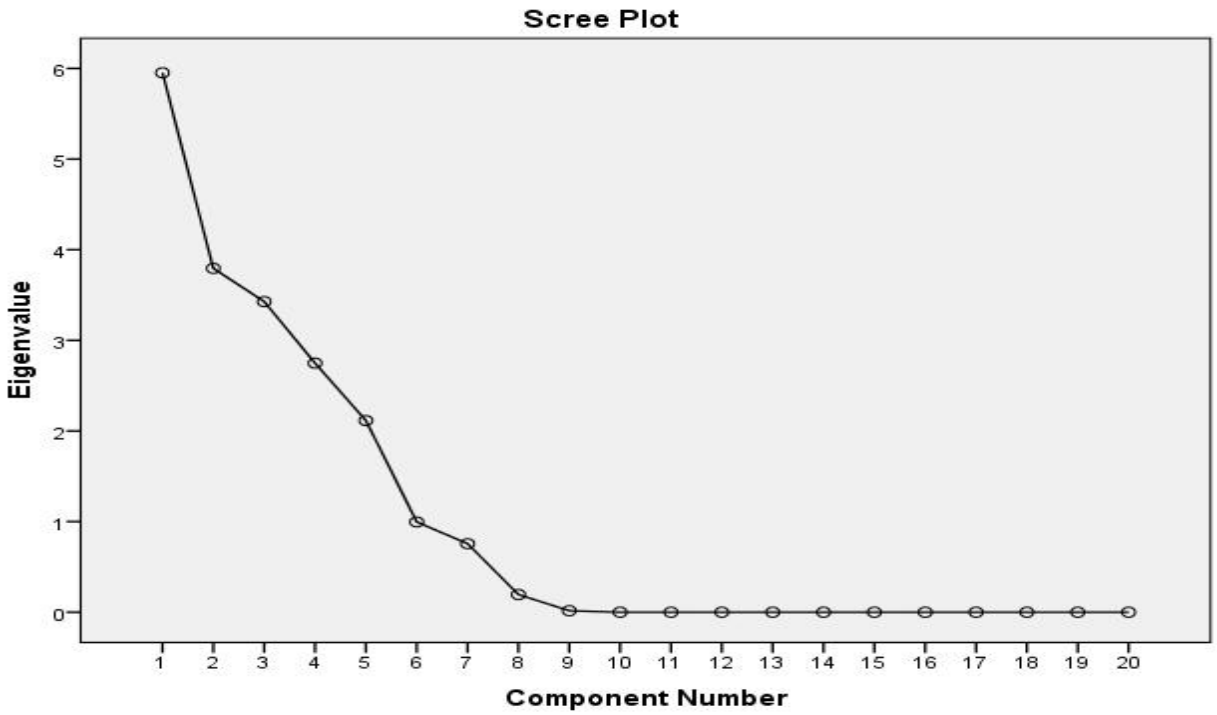

Fig 4.1: A Scree Plot of Total Variance
Source: ***SPSS Iterations***

Figure 4.1 shows a scree plot which indicates that from the 20-item variables optimally weighted and summed based on the Kaiser criterion of Eigen value cut-off of 1.0, there were

5 components that explained a cumulative variance of 90.1%. The Scree plot confirmed the findings of retaining 5 components. The last point of inflexion at component 6, signifies that only 5components should be retained.

Table 4.11 **Component Matrix[a]**

	Component				
	1	2	3	4	5
Telephone conversation are can enhance better communication during lockdown	.927				
Zoom and Skype communication methods are effective ways of communication delivery	.918				
Top management should prioritize Project delivery as a top priority	.821				-.315
Video call is the best method of communication for project delivery	.755		-.613		
Projects will be delivered if unwritten communication are employed	.691	.315	-.405	.316	
Oral communication on the part of the CEO/MD can contribute to much productivity	.691	.315	-.405	.316	
It is vital that the project managers communicate with Staff..	.682	-.371			.346
Covid-19 enforcement agent could disseminate prompt information during constructions	-.629	.575	-.361	-.343	
Workers put in their best when there is effective oral communication	.622	-.456	.556		
Oral communication is vital if projects must be delivered during COVID-19 pandemic.	.599	.307	.578	-.398	
Communication facilities are important in every organisation..		-.930			
Projects are delivered promptly during COVID-19 lockdown when E-conferencing is used for communication		.666	.408	-.489	
Written communication is very important in project management.		.543	.743		
communication on WhatsApp is key for project delivery management during pandemic.	.395	.503	-.639		
The use of drone technology should be encouraged for enhanced communication		-.509	.510	-.322	
There should be special COVID-19 communication			.362	.816	.37

facilities for project delivery.					5
Face to face communication reduces project delivery duration during covid.				-.710	.570
Effective communication makes staffs have a positive attitude towards work			.335	.623	.515
Even without proper communication, some projects would be delivered		.484	.429		-.696
Workers put in their best when there is effective oral and visual communication.	.328	-.539		.346	-.665

Source: SPSS V18 output

Table 4.11 shows the component matrix for the factors and subz-factors of the analysis which indicates the respective weight attributed to each question by the Likert scale of 5 points in line with the responses.

Table 4.12 **Rotated Component Matrix[a]**

	Component				
	1	2	3	4	5
Workers put in their best when there is effective oral and visual communication.	.944				
Covid-19 enforcement agent could disseminate prompt information during constructions.	-.866		.329	-.332	
Project delivery should be a paramount issue of concern to top management.	.819			-.348	
Telephone conversation are can enhance better communication during lockdown	.785	.383	.339		
Zoom and Skype communication methods are effective ways of communication delivery	.776	.373	.342		
It is vital that the project managers communicate with Staff.	.633				.566
Drone technology is the best communication tool for project in COVID-19 era	.600		-.465		-.594
communication on WhatsApp is key for project delivery management during pandemic		.880			
Projects will be delivered if unwritten communication are employed		.871			
Oral communication on the part of the CEO/MD can		.87			

contribute to much productivity.		1			
Video call is the best method of communication for project delivery	.429	.775		-.410	
The use of drone technology should be encouraged for enhanced communication		-.766			
Projects are delivered promptly during COVID-19 lockdown when E-conferencing is used for communication.			.906		
Communication facilities are important in every organisation.		-.405	-.884		
Oral communication is vital if projects must be delivered during COVID-19 pandemic	.607		.749		
Written communication is very important in project management.			.690	.627	
There should be special COVID-19 communication facilities for project delivery				.964	
Effective communication makes staffs have a positive attitude towards work.				.861	
Face to face communication reduces project delivery duration during covid					.908
Even without proper communication, some projects would be delivered			.519		-.823

Source: SPSS V18 output

Table 4.12 shows the rotated component matrix from the weighted inputs of the respondents on each question relative to each factor as analyzed using the 5-point Likert scaling technique.

Component 1: explained 29.760% of the total variance in the data analysed and has Eigen value of (5.952). Component 1 is the major effective communication factor for the construction company during the pandemic. Among the variables that correlated positively with component one and greater than 0.50 are;

Workers put in their best when there is effective oral and visual communication. 0.944

Project delivery should be a paramount issue of concern

to top management. 0.819

Telephone conversation can enhance better communication during lockdown 0.785

Zoom and Skype communication methods are effective ways of communication delivery 0.776

It is vital that the project managers communicate with Staff. 0.633

Drone technology is the best communication tool for project in COVID-19 era 0.600

The Workers put in their best when there is effective oral and visual communication variable has the highest factor loading of 94.4%. Thus, component one can be identified as workers oral and visual communication Factor.

Component 2: explained 18.971% of the total variance in the data analysed and has an Eigen value of (3.794). Component 2 is the next high effective communication factor for project delivery in a construction company during the pandemic. However, among the variables that correlated positively with component two and greater than 0.50 (significant) are;

Communication on WhatsApp is key for project delivery Management during pandemic 0.880

Projects will be delivered if unwritten communications are employed 0.871

Oral communication on the part of the CEO/MD can contribute to much productivity. 0.871

Video call is the best method of communication for project delivery0.775

The Communication on WhatsApp is key for project delivery management during pandemic variable has the highest factor loading of 88.0%. Thus, component two can be identified as social media factor.

Component 3: explained 17.14% of the total variance in the data analysed and has an Eigen value of (3.427). Among the variables that correlated positively with component 3 and are significant (greater than 0.50%) are;

Projects are delivered promptly during COVID-19 lockdown
when E-conferencing is used for communication. 0.906

Oral communication is vital if projects must be delivered during
COVID-19 pandemic 0.749

Communication is important in project management. 0.690

Therefore, component 3 can be identified as electronic communication factor because of the variable has the highest factor loading of 90.6% among the other variables.

Component 4: explained 13.7% of the total variance in the data sampled and has an Eigen value of 2.748. The variables that are significant and correlate positively with component 3 are as follows;

Written communication is very important in project management.0.964

There should be special COVID-19 communication facilities
for project delivery 0.861

Effective communication makes staffs have a positive attitude
towards work. 0.629

Since written communication is very important in project management has the highest factor loading of 96%, component 4 can be identified as written communication factor.

Component 5: explained 10.57% of the total variance in the data analysed and has an Eigen value of 2.114. The variables that are significant (> 0.50%) and correlate positively with component 5 are;

Face to face communication reduces project delivery duration during covid-19

Pandemic	0.908
Even without proper communication, some projects would be delivered	0.566

Component 5 can be identified as face to face communication factor because it has the highest factor loading (90.8%) among the other variable.

4.4 Tests of Hypotheses

Hypothesis One

Ho1: There are no significant communication factors in managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

HA1: There are significant communication factors in managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

From the total variance table and the scree plot of figure 4.1, PCA identified five underlying components explaining 90.1% of the communication factors. Further careful examination showed that communication factors for project delivery during COVID-19 lockdown include communication with drone technology variable has a factor loading of (0.600) > (0.50), written communication has factor loading of (0.964), communication on social media has a factor loading of (0.880) etc. This implies that the variables are significant communication for project delivery during the pandemic lockdown. Thus, the null hypothesis was rejected and the alternate accepted. The researcher concludes that there are significant communication factors in managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

Hypothesis two

Ho2: Communication with drone technology is not significantly important for managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

HA2: Communication with drone technology is significantly important for managing construction projects delivery amidst COVID-19 pandemic in Anambra state. From table 4.12, effective communication with drone technology variable has a factor loading of (0.600) > (0.50) on factor 1. This implies that the variable is significantly important for managing construction projects delivery amidst COVID-19 pandemic in Anambra state. Thus, the null hypothesis was rejected and the alternate accepted. The researcher concluded that communication with drone technology is significantly important for managing construction projects delivery amidst COVID-19 pandemic in Anambra State.

Hypothesis three

Ho3: Written communication does not significantly have influence in managing construction projects delivery amidst COVID-19 pandemic in Anambra state

HA3: Written communication significantly has influence in managing construction projects delivery amidst COVID-19 pandemic in Anambra state. Table 4.12 depicts that the variable on the importance of written communication has factor loading of (0.964) on factor 4. This implies that the variable is positive and significant (0.964 < 0.50). Thus, the null hypothesis was not accepted, that is; written communication significantly has influence in managing construction projects delivery amidst COVID-19 pandemic in Anambra state.

Hypothesis four

HO4: Communication with a social medium does not significantly improve performance in project delivery amid COVID-19 pandemic in Anambra state.

HA4: Communication with a social medium significantly improves performance in project delivery amid COVID-19 pandemic in Anambra state. From table 4.12, the variable on communication on social media has a factor loading of (0.880) on factor 2. This implies that the variable is significant (0.880 > 0.50). Thus the null hypothesis was rejected and alternate

hypothesis accepted, that is; Communication with a social medium significantly improves performance in project delivery amid COVID-19 pandemic in Anambra State.

4.5 Discussion of Results

Considering the contents of tables 4.8, 4.11 and 4.12, it was revealed that the Bartlett's test conducted proved to be statistically significant (Sig-value=0.000< 0.001). Also, the Kaiser-Meyer-Olkin (KMO) measure was approximately 0.49, indicating the data were sufficient for principal component analysis (PCA). The Bartlett's test of sphericity X2 = 206.821 (Chi-square), P< 0.001 showed that there were patterned relationships between the variables. Because the chi-square of 1206 for construction company studied with 18 degree of freedom are unlikely to have arisen by chance, the 87 staff of the company interviewed do not have equal opinion on effective communication for project delivery during the pandemic lockdown.

The results of the PCA empirically established that; from the 20-item variables optimally weighted and summed based on the Kaiser criterion of Eigen-value cut-off of 1.0, there were 5 components that explained a cumulative variance of 90.1%. The Scree plot confirmed the findings of retaining 4 factors, which are discussed as follows;

1. **Workers oral and visual communication:** explained 29.760% of the total variance in the data analysed and has Eigen value of (5.952) and is the major communicating factor for the company during pandemic.

2. Social media communication: explained 18.971% of the total variance in the data analysed and has an Eigen value of (3.794). However, it is the next most communicating factor for the employees. This factor correlates with the study of Liu (2014) and Kitachit

(2019), who found out that employee media communication and customers relationship is a *sine qua non* to project deliveries and organizational growth. He concluded that the effective communication brings about higher performance of the employee.

3. Electronic Communication Factor Written Communication: explained 17.14% of the total variance in the data analysed and has an Eigen value of (3.427).

4 **Face to face communication:** explained 13.7% of the total variance in the data sampled and has an Eigen value of 2.748. This view was seen by Eze, (2017) in his study on communication related factors in the implementation of road construction projects, Eze noted that face to face interaction ensure effective project performance.

The suspension of ongoing construction work before the outbreak of COVID-19 at NAUTH project site and the delay in communicating with the workers to return to site affected the project duration. This therefore brings to the fore the need to transmit project information timely to avoid delaying project planned completion time.

On objective three, using the result of the hypothesis: Written communications significantly have influence in managing construction projects delivery amidst COVID-19 pandemic in Anambra State. Kitachit (2019), (Ugwu, 2018) and Liu (2014) and Nazia et al, (2016) also agree with this finding. Appropriate communication factor especially lay down procedures on a written form ensures adequate synergy within the scope of any project, these were the contributions of these authors, they maintained that this has significant effect on successful delivery of construction projects in Anambra State, NAUTH projects Nnewi inclusive.

Communication with a social medium significantly improves performance in project delivery amid COVID-19 pandemic in Anambra state. this is in line with the works of Mavuso and Agumba, (2016) who studied Factors of communication management for successful project delivery in the Swaziland construction industry and identified eight communication factors which included the use of social media.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the objectives of the study, the following conclusions were drawn;

a. There are communication factors that have been identified such as oral and visual communication, Social media communication and electronic communication factor written communication and they are the major communicating factors for the company during pandemic.

b. the effects of corona virus pandemic or disease outbreak which hitherto has not been discussed with respect to effective communication management and its effect on successful construction project delivery was done in this study.

i. The cost of NAUTH construction projects increased due to poor communication management by project stakeholders occasioned by Corona virus outbreak and its associated problems like social distancing, use of preventive devices, etc.

ii. Effective project management does not warrant stoppage of project activities until all activities are successfully completed. Unfortunately, the ongoing construction works before the outbreak of COVID-19 at NAUTH project site were stopped. This gave room for the extension of project completion time. Also the delay experienced in communicating with the workers to return to site affected the project duration.

iii Four of the identified communication management factors (poor/crude communication, language problem, illiteracy level and high cost of communication) significantly affected NAUTH construction project delivery at Nnewi in Anambra State as a result of Corona virus outbreak in Nigeria. However, there is need to consider the nature of communication methods, language of communication, level of formal education of the workforce and cost of effective communication in order to minimize their effects for enhanced project success.

iv The joint effect of the factors should be looked into as they collectively posed a significant challenge to effective communication which affected NAUTH construction delivery within

specified time and cost. At this point, organisational politics should be critically considered to ascertain the role it actually played in ensuring effective communication during the COVID-19 pandemic era.

v. Recently, the menace of COVID-19 outbreak has assumed an increasing dimension. Unfortunately, it may also affect communication which will reduce the rate of construction project success. Considerable efforts should be made to fashion ways of improving communication in the NAUTH sites, Nnewi and other construction sites in Anambra State to forestall any effect that increasing corona virus may pose to effective communication and successful project 79 planning and implementation.

5.2 Recommendations

The study, therefore recommends the following measures;

i. The NAUTH project stakeholders should source for additional funds, outside the project budget, to procure the needed equipment and COVID-19 measures as prescribed by the Nigeria Centre for Disease Control to guide against using project budgeted funds to fight the ravaging pandemic, thereby incurring cost overrun.

ii. If the recommendation made in (i) above is done, the problem of suspending project activities will be checked and there will not be any bridge in communication which will affect timely delivery of NAUTH projects, Nnewi and other projects in Anambra State. With this, time overrun due to communication related issues will be averted.

iii. The NAUTH project stakeholders should adopt modern methods of communication like the use of Webinar for meetings, e-conferencing, whatsApp (video, conferencing and chat groups), zoom meeting, phone conferencing, “skyping“ etc. as against the face-to-face meetings or traditional methods of communication which has reduced productivity in the COVID-19 era.

A general language of communication should be adopted as most of the stakeholders and site workers at NAUTH project site, Nnewi are not from a particular tribe which understand a particular language. The study recommends the use of English language, since it is an official language in Nigeria.

To adopt English language as a means of communication, there is the need to train most construction workers to attend a minimum level of education in order to cope with communication related issues on site for improved communication and project success, especially during the era of corona virus outbreak.

However, the associated high cost of communication can be minimized if the NAUTH project stakeholders adopt the use of the Social Media and Enterprise Resource Planning (ERP) which are gaining more grounds than the traditional communication channels. There are a lot of Applications (Apps) the world uses for project and business management where the whole project team including stakeholders, users, suppliers, manufacturers etc., are networked into exchanging and sharing all information. Some of them are designed to use intranet while some do not require internet facility.

iv. Lastly, to minimize the inverse effect of increasing menace of COVID-19 outbreak on construction project delivery, the study strongly recommends NAUTH stakeholders to fully adopt the recommendations made in this study for improved project success, even amidst the increasing spread of corona virus in Nigeria.

5.3 Contributions to Knowledge

So far, this study has added the following to the existing body of knowledge;

a. Oral and visual communication, Social media communication, electronic communication factor and written communication are the major communicating factors for the company during pandemic.

b. the effects of corona virus pandemic or disease outbreak which hitherto has not been discussed with respect to effective communication management and its effect on successful construction project delivery was done in this study.

c. The study also determined the collective effects of communication related factors on construction project delivery during COVID-19 outbreak.

REFERENCES

Aldershot, UK: Gower. Cabała, P. and Wawak, S.S. (2020). How COVID-19 Changes Project Management, Department of Management Process at the Cracow University of Economics, Retrieved on 5/6/2021 from linkedin.com/pulse.

Binder, J. (2017) Global Project Management: Communication, Collaboration and Management across Borders.

Chikwe F.D. (2015) Communication Management for Effective Delivery of Construction Projects in Rivers State, International Journal of Physical Sciences, 2(5).

Corman, S. (2010) Effective Communication Contributes to Rural Change, Opinion and Report, 2 (1), July Edition.

Corman, S., Trethewey, A. and Goodall, B. (2007) Evaluation of Strategic Communication in Manufacturing Organization, International Journal of Project Management 3(1).

Demiray, L.F. (2011) Critical success factors effective communication for construction projects. Team Performance Management, 16 (7).

Diego, L. (2014) Information Management System in a Project Environment in Russia, International Project Management Journal 2 (4).

Eze, F.G. (2017) Communication Management System for Effective Project Implementation in a Developing Country, International Journal of Management Sciences,3(1).

George, L. (2016) Project Communication Management, PMBoK Guide, Fifth Edition, June 29. Hallows, J. (2015) Information systems project management: How to deliver function and value in information technology projects. New York:AMACOM.

Hedieh, Shakeri and Mohammad (2019): Analysis of factors affecting project communications with a hybrid DEMATEL-ISM approach (A case study in Iran). Cell Press. Heliyon

Ikonne, J.S. (2014) A study of construction projects from a perspective of Communication Management, International Journal of ProjectManagement,29.

Inloox (2020) Communication in Project Management, Project Management Glossary, www.inloox.com, September, 4.

Kothari C.R., (2004).Sample Size Determination. Research Methodology. New Age International Publications, 1(1), 74-81.

Kitachit, W.G (2019): Project Communication Management in Twenty-first century – Trends across the Millennium. Keynote Speeches, IPMA/Soviet Congress, Moscow, September.

Kliem, R. L. (2018) Effective communications for project management. Boca Raton, FL: Auerbach Publications.

Knoop, K. (2016) Computerized DSS for construction conflict resolution under communication uncertainty. Journal of Construction Engineering and Management, 136 (12).

Kuga, L. A. (2016). Communicating in a diverse workplace: A practical guide to successful workplace communication techniques.
Irvine, CA: Richard Chang Associates, Inc.

Levine, T. (2020). How the novel coronavirus pandemic has affected the way we communicate and its critical impact on our daily communication skills. College of Arts and Sciences, University of Alabama, Birmingham. Retrieve on 5/6/2021, www.uab.edu/news/research.

Likert, R. (1932). Atechnique for the measurement of attitudes. Archives of Psychology, 22(140), 55-65.

Liu, L.S. (2014). Effective Communication as a Criterion for Project Success. International Project Management Journal, IV(II).

Mavuso, N.M. 1 and Agumba, J.N. (2016): Factors of communication management for successful project delivery in the Swaziland construction industry: Proceedings of the 9th Annual Quantity Surveying Research Conference, Port. Elizabeth, 19-21 October 2016.

Nazia I., Bilal K., and Abdul .W.S. (2016): critical factors influencing the project success: an analysis of projects in manufacturing and construction in Pakistan. Arabian Journal of Business and Management Review (Oman Chapter) Vol. 6, No.2, September 2016.

Nutcache (2019). The Need for Communication Management in Project Management, www.nutcache.com, May, 12.

Phillips, J. (2017) CAPM/PMP Project Management all-in-one Exam Guide. New York: McGraw-Hill.

Project Management Institute (2013). The Essential Role of Communications, Pulse of the Profession In-Depth Report: The High Cost of Low Performance: May, PMI.org/Pulse.

Project Management Institute (2008) A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (4th ed.). Newtown Square, PA: Project Management Institute.

Project Management Institute (2013). Project Management Institute Annual Report. The Project Management Institute, U.S.A.

Rajkumar, S. (2010). Art of communication in project management. Paper presented at PMI® Research Conference: Defining the Future of Project Management, Washington, DC. Newtown Square, PA: Project Management Institute.

Sherkey, E.D. (2009). Managing Project-Related Communication Factors- The Lessons of Success, Management and Development Series, World Bank.

Singh, T. (2012) Information Processing and Communication Management in Organizations, Journal of Information Technology and Management, 3(2).

Sonta E, (2021) impact of the pandemic on many aspects of our lives, Warsaw School of Economics, May, 2021, Retrieved on 9/6/2021 fromlinkedin.com/pulse.

Taleb H., Ismail S, Wahab M.H and Wan, N.M. (2017). An overview of project communication Management in Construction Industry Projects. International Journal of Industrial Organisation.1 (1),1-9.

Tatham, I, H. (2010). Application of the Pragmatic Complexity Model in

Organizational Communication Processes, Journal of Scientific 85 Research, 3(5). Ugwu, D.C. (2018) Strategic Communication in Project Oriented Organization in a Developing Economy, Gordon Publishing Company Ltd.Lagos.

Wideman, M. (2001). Political Influence in Project Management Processes: The Way Forward, Retrieved from www.maxwideman.com , June, 21.

Yvonne, T (2020). How has COVID-19 affected the way we communicate? University of Alabama, Birmingham, September, 8. Retrieved on 5/6/2021From www.uab.edu/news/research.

APPENDIX

Questionnaire Respondent,

QUESTIONNAIRE FOR STUDY ON COMMUNICATION FACTORS FOR MANAGING CONSTRUCTION PROJECTS DELIVERY AMIDST CORONA VIRUS PANDEMIC IN ANAMBRA STATE

Please, we are requesting you to spend some time to respond to the questions and statements raised in this questionnaire to the best of your knowledge regarding communication management factors in construction project delivery. Respond by ticking (X) against the option that best expresses your candid opinion, attitude and perception. We assure you that the information provided will be strictly used for research purposes.

Yours faithfully,
Chukwuneke, Chetanna Jude
20174080878

Questionnaire Instruction:

Indicate your level of agreement and disagreement regarding the statements/ questions raised regarding Communication Factors for Managing Construction Projects Delivery amidst Corona Virus Pandemic in Anambra State. Based on the five-point scale has been provided. Please tick the cell that represent your level of agreement, neutral and disagreement regarding the statements made on the identified communication related factors for managing construction project delivery in Anambra State, especially, at Nnamdi Azikiwe University Teaching Hospital construction project site, Nnewi.

SD = Strongly Disagree = 1 Point

D = Disagree = 2 Points

N = Neutral = 3 Points

A =Agree = 4 Points

SA = Strongly Agree = 5 Points

PART II Question

1 Communication is important in project management.

2 It is vital that the project managers communicate with Staff.

3 Workers put in their best when there is effective oral communication.

4 Drone technology is the best communication tool for project in COVID-19 era.

5 Effective communication makes staffs have a positive attitude towards work.

6 Project delivery should be a paramount issue of concern to top management.

7 Oral communication is vital if projects must be delivered during COVID-19 pandemic

8 Even without proper communication, some projects would be delivered.

9 Projects will be delivered if unwritten communication are employed

10 Telephone conversations are can enhance better communication during lockdown.

11 Zoom and Skype communication methods are effective ways of communication delivery.

12 Communication on WhatsApp is key for project delivery management during pandemic.

13 The use of drone technology should be encouraged for enhanced communication

14 Communication facilities are important in every organisation.

15 Oral communication on the part of the CEO/MD can contribute to much productivity.

16 There should be special COVID-19 communication facilities for project delivery.

17 Covid-19 enforcement agent could disseminate prompt information during constructions.

18 Projects are delivered promptly during COVID-19 lockdown when E-conferencing is used for communication.

19 Face to face communication reduces project delivery duration during covid.

20 Video call is the best method of communication for project delivery.