



**A Study on Effective Communication for Effective Delivery of Programme in
Construction Industry**

دراسة حول الاتصال الفعال لإنجاز برامج المشاريع الإنشائية

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Abstract

Nowadays, a programme management approach is widely used in the construction industry. The programme management approach usually involves interdependencies between projects. Therefore, there should be effective communication between the programme management team to be able to effectively manage project interdependencies and, thus, effectively deliver the programme .

This research investigates major factors that impact effective communication in a construction programme, as well as to what extent effective communication impacts effective programme delivery. The study introduction clarifies the importance and background of the subject, and identifies the research objective. A comprehensive literature review chapter led to the development of a conceptual model. This conceptual model presents a relationship between major factors that impact effective communication in a construction programme and major factors that impacts effective delivery of a construction programme.

Two large construction programmes were selected to present the case studies in this research. A qualitative research method, including an interview questionnaire, was used to collect data from two programme managers and six different project managers. Accordingly, collected data was analyzed via the conceptual model. The discussion was made, and comprehensive comparison was conducted between each factor of the two case studies.

The study concludes that there is a positive relationship between effective communication in a construction programme and effective delivery of a construction programme. The study also concluded that information symmetry between different teams and the programme management team, interpersonal communication skills for the programme and project managers, and team commitment to effective communication are the fundamental factors required in order to ensure effective communication in a construction programme.

المخلص

في الوقت الحاضر، يتم استخدام نهج إدارة البرامج على نطاق واسع في قطاع الانشاءات و التشييد. نهج إدارة البرامج عادة ما يبنى على الترابط بين المشاريع. لذلك، يجب أن يكون التواصل فعال بين جميع اعضاء فريق إدارة البرنامج ليصبح الفريق قادرا على إدارة وتنفيذ المشاريع المترابطة بشكل فعال، وعليه يتم تنفيذ البرنامج الكامل بشكل فعال.

يدرس هذا البحث العوامل الرئيسية التي تؤثر على التواصل الفعال في برامج الانشاءات والتشييد، وإلى أي مدى يؤثر الاتصال الفعال بين اعضاء فريق العمل على انجاز البرنامج بشكل فعال. توضح مقدمة الدراسة أهمية وخلفية هذا الموضوع، كما وتحدد الهدف من هذا البحث. بالإضافة لذلك تم بناء نموذج مفاهيمي من خلال دراسة شاملة للمراجع الخاصة بموضوع البحث. يعرض هذا النموذج المفاهيمي وجود علاقة بين العوامل الرئيسية التي تؤثر على التواصل الفعال في البرامج الخاصة بقطاع الانشاءات والتشييد والعوامل الرئيسية التي تؤثر على انجاز البرامج الخاصة بنفس القطاع بشكل فعال.

وقد تم اختيار برنامجين من كبرى برامج قطاع الانشاءات والتشييد في دولة الامارات العربية المتحدة، وتم عمل دراسة واقعية على هذه البرامج وتطبيق مفاهيم النموذج المفاهيمي عليها. تم استخدام طريقة البحث النوعي في هذه الدراسة، تم تصميم استبيان يشتمل على جميع العوامل المطروحة في النموذج المفاهيمي المعد سابقا ، وتم تعبئة هذا الاستبيان من خلال مقابلة شخصية اجرية مع مديري البرامج وستة من مديري المشاريع المختلفة. وبناء على ذلك، تم تحليل البيانات التي تم جمعها استنادا على النموذج المفاهيمي. ومن ثم تم اجراء مقارنة شاملة لكل عامل من العوامل في كلا البرنامجين.

اظهرت نتائج البحث أن هناك علاقة إيجابية بين التواصل الفعال في برنامج الانشاءات والتشييد وبين انهاء البرنامج بشكل فعال. وخلصت الدراسة أيضا إلى أن تماثل المعلومات بين جميع الفرق العاملة في البرنامج، ومهارات التواصل مع الآخرين لمديري البرامج والمشاريع، والتزام فريق العمل بالتواصل الفعال هي العوامل الأساسية المطلوبة لضمان التواصل الفعال بين جميع الفرق العاملة في برنامج الانشاءات والتشييد.

Definitions

Project : as a temporary task in which resources are structured to attempt to a scope of work of specified particular specification, within time, cost and quality constraints, in order to deliver valuable product.

Interdependency : Is the relationship between the preceding tasks and the succeeding tasks of a project or the relationship between different projects in a programme.

Programme : “a group of related projects managed in a coordinated way”

Programme Management: programme management is an organized structure that adjusts and assigns resources, and plans, construct and deals with various related construction projects to accomplish specific objectives that cannot be achieved if projects are managed independently.

Programme management team: client team, consultant team and contractors management team.

programme involved parties: programme management team , internal stakeholders(other departments within the client organization) and external stakeholders such as government authorities.

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1 Introduction

1.1 Overview

The construction industry is essential for the economic development of any nation. The construction industry relies upon the capabilities of various people, from unskilled and skilled labourers, professional management and executives. The speed of economic progression of any country can be measured by the development of concrete infrastructure such as roads, buildings, bridges and power stations. Therefore, it becomes critical for construction companies to use various approaches in construction development to be able to achieve organizations intended strategy.

The dynamic and fragmented nature of the construction industry involves multiple components, which makes construction programme development cycles more complex. Human interaction and multi-cultural teams also contribute to making the construction process more complicated. Chris (2009) emphasizes that the construction industry contains an extensive variety of projects, each with interdependencies, interconnected tasks, sub-tasks and work packages, which add more complexity to the execution process.

Construction can be seen as a process of placing together all the resources in an organized and timely manner by using related assets to finish a structure according to design particulars and quality criteria. Building construction is the procedure of adding structure to actual property, for example, housing, clinic centers or sporting stadiums. Civil construction includes all infrastructure activities, such as roads, utilities, airports, golf courses, landscaping or harbours. Dubois and Gadde (2002) state that appropriate construction management requires understanding complex elements of the construction industry, which deals with ambiguities and interdependencies.

The construction industry is frequently censured for poor performance and ineffective delivery of anticipated objectives. In many cases this is related to complex and specialized programmes environments. These programmes are dynamic, iterative and include many variations all through their planning and execution. In this atmosphere, monitoring and controlling the critical factors that could have an impact on programme performance is crucial.

The construction industry depends on coordination and interactions between diverse stakeholders and teams along the entire programme implementation lifecycle. Furthermore, the

development process of a construction programme includes many parties, different procedures, different phases and diverse stages of works, as well as significant contribution from both public and private parties, with an important objective being to take the programme to a successful end.

Within most construction programmes, teams vary and are sometimes geographically isolated. Therefore, communication is critical in the construction industry. Emmerson (1962), Latham (1994), and Detr (1998) all state that frequently issues in construction are introduced as communication problems. Because of construction industry particular attributes, the industry builds a multi-dimensional communication environment. Gerald (2000) states that communication issues are the most prominent challenge in construction industry, on the grounds that project managers usually spend more than 75% of their time communicating.

Badiru (2008) explains that communication management is the learning field that utilizes the procedures needed to guarantee timely and suitable gathering, circulation, storage, recovery and definitive character of programme information. The procedure of construction, contingent upon the complexity of the completed structure needs a significant level of coordination between all parties, from experts to skilled design personnel, until the programme is finished. Usually persons involved in the construction programme lifecycle are, from the client side, programme manager, project managers, project control managers, and more, and from the consultant side, design engineers, inspectors, supervisors, QS, planning engineers, and more. There will also be a contractor team, subcontractors and suppliers' teams. Therefore, effective communication and proper coordination between these different parties in construction programme development is crucial.

Programme management is utilized extensively as a method of managing project interdependencies in order to achieve strategic goals. The methodology is utilized to execute strategy, to create and sustain new capabilities, to handle complex data frameworks and numerous different business alterations. Gray (1997), and Lycett, Rassau, and Dansonet (2004) define programme management as an amalgamated methodology that can reorganize the successful delivery of projects to achieve desired goals. For instance, the Project Management Institute's 1996 Guide to the Project Management Body of Knowledge PMBOK (2008) defines a programme as: "a group of related projects managed in a coordinated way".

1.2 Background

Since the mid-1940s, writing on communication in the construction industry has essentially focused on the condition in the UK (Gorse & Emmitt, 2003). Numerous issues concerning communication have been reported, with an emphasis on internal team communication, suppliers and contractor communication, external communication between project manager and stakeholders and others involved in construction project development process. Dainty, Moore, and Murray (2006) state that one of the fundamental reasons behind poor project performance is ineffective communication practices between different teams within a construction project environment. The researchers added that the temporary and interdisciplinary nature of the project team develops many problems in construction projects during the implementation phase.

Good quality communication in a construction programme is essential to ensure efficiency and effectiveness of the programme development process. Literature mentions four reasons why improving communication is important for the construction industry. First, Thomas, Tucker and Kelly (1998), Franks (1998), and Somogyi (1999) state that enhancing communication between project team, suppliers and contractors will reduce the probability of project failure. Secondly, Lenard and Eckersley (1997) state that open communication between different levels within the construction project team results in innovation and better technical solutions during project implementation stage. Third, Emmitt and Gorse (2003), Brown (2001), and Usmani and Winch (1993) state that enhancing the communication process between teams and stakeholders at the early stage of the project positively impacts project performance and quality of works. Finally, Barret (1995) and Salisbury (1998) explain that enhancing communication during briefing can lead to better decision making. For instance, improvement in communication during briefing stage can positively impact the speed of moving to resolution and supply advance methods of examining the requirements at early stage.

Over the years, researches have determined that enhancing communication in construction project development positively impacts project outcomes. In spite of the fact that studies emphasize numerous characteristics of communication in the construction industry, however, no writing was found on the relationship between effective communication and effective delivery of a programme. Most literature focuses on the improvement of

communication between internal teams and stakeholders, with no specific details on the impacts on effective programme delivery.

Construction programmes are usually a compilation of multidisciplinary activities, often large scale, and require input from different teams and specialists during the course of implementation. These characteristics frequently introduce uncertainty into project life cycles and therefore could the effective delivery of a programme.

1.3 Statement of the Problem

The problem is the ineffective delivery of construction programmes because of poor communication between the programme management team. Nowadays, construction developers and real estate companies reorganizing their projects in programme approach to be able to achieve certain strategy's goals. These companies are facing challenges to deliver effective programme due to ineffective sharing of information between interdependent projects. Biggs (1997) and Tam (1999) found that various studies emphasized the significance of efficient communication for project success which led to effective delivery of a programme.

The nowadays delay for completion and the additional cost incurred in construction programmes are likely traced back to poor coordination created by inadequate, inapplicable, incorrect, incompatible, and/or late information. And hence, effective communication between interdependent project teams within the programme are mandatory to ensure programme success. Thiry (2004) states that interdependencies within projects are the impacts that projects may have on one another and to their shared contribution to the advantages of the organization. Teller, Unger, Kock, and Gemünde (2012) argue that a programme intricacy measured as far as project interdependencies is a matter of specific significance in the field of programme management as it structures programme manageability and thusly influences entire programme success.

1.4 Aim of the Dissertation

There is a lack of research on effective communication and effective delivery of construction programme. This dissertation aims to examine and assess effective communication in several construction programmes 'in United Arab Emirates.

1.5 Research objective

In order to achieve the aim of this dissertation, the study will address in detail the following objective statements:

1. Investigate the major factors that impact effective communication in a construction programme.
2. Examine the impact of effective communication on the effective delivery of a construction programme.

1.6 Research questions

Q1. What major factors impact effective communication in a construction programme?

Q2. What is the impact of effective communication on effective delivery of a construction programme?

2 Literature Review

2.1 Introduction

Construction programmes are usually large and multidisciplinary, and require contributions from diverse parties. Uncertainty is continuously introduced in various stages of programme planning and execution. Ferns (1991) and Milosevic (2007) have concluded that uncertainty increases according to the programme size and the complexity of project interdependencies. Today's construction industry exists in an atmosphere of extensive financial and market instabilities (Young, 2008). Young emphasizes that regional economies are progressively interdependent and new difficulties appear every day that lead to change market situations. Rayner (2007) states that programme management should be broken down into comprehensive elements in order for it to be recognized and acknowledged in the construction industry. Therefore, this chapter reviews literature on effective communication for management of project interdependencies in construction programmes. The chapter synthesizes and critically analyzes previous studies' ideas and outcomes. In the end, the chapter identifies research gaps that exist in the current literature.

2.2 Programme Management

Programme management is used to execute strategy, create and maintain new capacities, and manage complex information (Partington, Pellegrinelli, & Young, 2005; Ribbers & Schoo, 2002). Ferns (1991) described programme management as a way to organize projects in order to maximize advantages. Further, Thiry and Deguire (2007) suggested that programmes could include both projects and operational tasks and that the center rationale for the formation of a programme was the acknowledgment of strategic advantages. Vereecke, Pandelaere, Deschoolmeester, and Stevens (2003) noticed a lack of understanding of programme management and proposed that this reflected a lack of professional experience during programme implementation .

Literature presents and defines programme in different ways. Perhaps most applicable in the construction industry is the PMBOK definition: “a group of related projects managed in a coordinated way” (2014) subsequently, PMMOK has looked to adjust, refine and improve project management processes and procedures to adapt to the complex nature of interdependencies.

Milosevic, Martinelli, and Waddell (2007) argue that the term programme management is inaccurately and inadequately described. For the purpose of this dissertation, programme management is an organized structure that adjusts and assigns resources, and plans, construct and deals with various related construction projects to accomplish specific objectives that cannot be achieved if projects are managed independently. However, for project, Turner (2009) and PMBOK (2008) defined project as a temporary task in which resources are structured to attempt to a scope of work of specified particular specification, within time, cost and quality constraints, in order to deliver valuable product.

2.2.1 Why programme management is necessary

Pellegrinelli (1997) emphasizes that programme management is valuable where incorporating interdependent projects is essential to deliver viable achievement. The development of project management and its restrictions brought birth to programme management as a true method for aligning, organizing and dealing with a portfolio of projects to provide advantages that would not have been conceivable had the projects been managed alone (Maylor, Brady, Cooke-Davies, & Hodgson, 2006; Partington et al., 2005). Moreover, Lycett, Rassau, and Danson (2004) demonstrated that, over time, problems have occurred where numerous projects inside of organization face certain problems. These problems adversely influence proficiency and viability and prompts disarray over the obligation of multiple projects.

2.2.2 Programme success

Program management can only be effectively executed in any organization if there is commitment from senior management and different project teams (Zayyana & Akintola, 2009;

Williams, 2006; Black, 2000). Sambasivan (2007) added that the top management should provide support and commitment and suitable policy. Programme management entails planning and coordinating large and disparate projects. It involves recognizing and understanding risks connected with composite interdependencies, keeping focus on the complete business advantages, and coordinating huge and regularly scattered projects. Further, it requires establishing effective communication between (Williams and Parr, 2004).

2.3 Project interdependencies in Construction Programme

Many researchers and publicists have studied project interdependencies, especially in construction programmes. The interdependencies between different construction projects result in complexities for the management of project portfolio within organizations. Complexities due to the inappropriate sharing of information among different project teams pose challenges, such as difficulties forecasting the flow-on effects from changes that may happen to project portfolio. In this regard, comprehending project interdependencies is especially important.

According to Marmel (2011), interdependencies are central to visualization of the actual length of a project. Daley (2013), and Kenley and Seppanen (2006) define a project interdependency as the relationship between the preceding tasks and the succeeding tasks of a project or the relationship between different projects in a programme. In this case, a given project may have more than one preceding tasks and more than multiple succeeding tasks. Stevenson (2013) identified four types of project interdependencies. First, finish-to-start interdependencies, in which predecessor tasks must finish before successor ones begin. For instance, in a construction project, the digging of foundations must be complete before the laying of concretes can be done. Second, start-to-start interdependencies, where predecessor tasks must begin before the successor does the same. Third, finish-to-finish interdependencies, whereby predecessor tasks must be completed before the successor tasks can be completed. The final type of dependency is start-to-finish, where predecessor tasks must start before successor tasks can be completed.

Marmel (2011) explains that interdependencies happen because all tasks within given a project hardly can happen simultaneously and that there are instances in which some tasks must commence or finish before others can begin or finalize. Marmel (2011) further explains that the reasons project interdependencies may be underlined by factors such as the inability of

resources to do more than one task at a time, inadequate or unavailability of equipment, or the nature or essence of a project; for instance, it is not possible to begin construction without first having a proper project plan or obtaining the prerequisite permit. Marmel's (2011) argues that it is not easy to determine the total amount of time that a project needs to be complete until team members establish the interdependencies and durations of projects.

Leido (2013) and Heldman (2015) identified other types of interdependencies within a construction program. These include mandatory, discretionary, external, and internal interdependencies. According to the researchers, mandatory interdependencies are ones that are required in a contractual agreement or exist due to the nature of the project and the construction programme is going to be implemented. Project managers often determine discretionary interdependencies, where project managers or team members schedule tasks based on their own discretion (Leido, 2013; Heldman, 2015). According to Chin (2004), external interdependencies involve programme projects that are dependent on external factors, such as vendors of required construction materials. Chin (2004), further explains that external interdependencies include factors on which projects depend and are out of project managers' control. Internal interdependencies include factors over which project managers or team members have complete control.

Maheswari, Varghese and Sridharan (2006) explain that dependency relationships among different projects/activities within a construction programme are in three forms: independent, dependent and interdependent. The researchers contend that if a programme consists of independent tasks within the projects, there are fewer challenges or problems with implementation. However, according to them, the concurrent performance of dependent or interdependent tasks within a project requires that certain assumptions must be made. They have further explained that such activities require presumed information in order to commence and progress even if they are executed successively.

Based on the foregoing arguments by different researchers, it is clear that projects within a programme can pose many challenges due to complexities in terms of interdependencies. Hence, effective programme management in the construction industry requires a high level of skill and effective collaboration among team members in different projects and program managers. According to Yang, Wang and Jin (2014), achieving construction program success requires that project managers must work with individual needs of all stakeholders, the community, and teams participating in the execution of a programme.

Kelly, Male and Graham (2014) emphasize that for efficient and effective management of projects where there are interdependencies and where many team members and project managers are working together, information symmetry is crucial. In such scenarios, communication is important for managing interdependencies to ensure successful implementation of construction programmes.

According to Mead and Gruneberg (2013), most projects are seldom conducted in isolated contexts, without interdependencies. Project managers or relevant team members need to plan, link and manage all project interdependencies across different phases of construction, teams, relevant departments and available resources to ensure success (Mead & Gruneberg, 2013). In order to achieve this, Ramesh (2010) notes that communication is very crucial. It is worth noting that many researchers have published on the significance of communication to the management of project interdependencies, especially with the construction industry where many construction programmes involving different teams and project managers are involved. The presence or absence of proper communication can define the success of a construction project.

2.4 Communication in construction industry

Young found that communication was thought to be the most imperative expertise out of 23 skills and knowledge subjects between high level manager of the construction industry; for directors at a middle management level, it was the most significant expertise out of 18 skills and knowledge subjects; and for other employees it was the second most significant expertise out of 20 skills and knowledge subjects (as cited in Egbu, 1999).

The general significance of communication abilities for project and programme success was further confirmed by Müller and Turner (2005). Yang, Huang, and Wu (2011) demonstrated the significant impact of teamwork on project success, while highlighting that group communication is a critical function of teamwork. They also demonstrated that things like team commitment enhance effective communication. Moreover, Jarvenpaa and Leidner (1999) stated that trust between colleagues enhanced communication across the team. Romahn and Hartman (1999) also highlighted the significant impact of trust in communication. Zaghoul and Hartman (2000), identified three types of trust that clarify why individuals place their trust in another group in construction projects: competence trust, honesty trust and natural

trust. Competence trust depends on opinions of others' capability to accomplish the required job. Honesty trust depends on views of others' readiness to defend the interest of their partners. Natural trust is established upon preconceptions, preferences or others' individual spirit towards counterparts.

A programme manager's communication abilities frequently have superior impact on programme success. For instance, their communication abilities might positively impact projects performance and have a positive effect on projects culture, which then might increase team members' motivation and therefore the probability of programme success. Ankrah et al. (2009) interviewed nine experienced professionals working in the UK construction industry who all highlighted the significance of communication for project culture. Communication can also impact leadership value, which can effect programme success. Toor and Ogunlana (2009), through 78 questionnaires and 35 interviews with project managers, deputy project managers and other senior supervisors on a mega construction project in Thailand, showed that poor communication was the second most significant of 13 adverse individual characteristics. This confirms Odusami's study (2002), which observed communication to be the second most crucial skill out of 13 aptitudes for successful project leadership in construction.

Higgin and Jessop's research (1965) for the Tavistock Institute of Human Relations is maybe the most specific study concerning communication in the building process. Their initial analysis brought about a further report being issued by Tavistock Publications: "Interdependence and Uncertainty: A Study of the Building Process, 1966". Though both studies are older, they contributed numerous important ideas to this dissertation. Communication problems appeared to be at many levels inside of the building projects featured in Higgin and Jessop's research. The main communication problems addressed by Higgin and Jessop (1965) were: a) design team internal communication; b) contract understanding and related contractual communication; and c) communication during construction within construction project team. The communication problems indicated above have been widely explored in several studies.

2.4.1 **Communication problems in construction industry**

There are significant problems in the construction industry related to communication (Higgin and Jessop, 2001). Many of those clients know little about the technical and specialized services available to determine their exact requirements and to fulfill these requirements. Oberlender (2000) states that communication problems contain misdirecting and exchanging of uncertain information, for example, design drawings, report, contracts, and work instructions. In the event that communication is enhanced at the early stage of execution, the design principles are recognized and clients are more likely to be satisfied.

Usually when project start, the majority of contracting parties involved have just met each other. It is difficult for them to create trust. Communication consequently plays a crucial role in bringing individuals together to share information consistently. Muller and Turner (2005) state that at the preliminary stage of a project, information concerning project goals, customer requirements, limitations, specifications, priorities and more are essential to creating a platform for improvement of common understanding and trust. Jarvenpaa and Leidner (1999) state that communication can provide more than just data transfer; it also empowers different project teams within the programme to articulate their worries and issues. Pietroforte (1997) notes that when individuals are open to learning from others, their relationships can be encouraged. Efficient communication can be seen as a sign of readiness and good faith inside of a programme management team.

2.5 **Communication and Interdependencies**

Thomsett (2002) notes that efficiency and success of construction programmes depend upon the quality of relationships between clients, contractors, professionals, and subcontractors. Cohen (2011) and Ogunlana (2003) also contend that all different stages of construction depend on the transfer of relevant information: as a project unfolds and design is achieved, information in the forms of drawing, construction methods and specifications must be communicated from one department or expert to another.

Bankvall, Bygballe, Dubois and Jahre (2010) argue that construction programmes are highly intricate because of interdependencies between different projects, activities and parts, all of which need to be effectively and efficiently coordinated. Since different people and

experts working together in a team undertake these activities, effective communication becomes key to success in a construction programme. Indeed, project dependency results in information dependency, whereby individuals working on different projects, components or tasks rely on information that is passed to them from others. For instance, where there is a finish-to-start dependency, the communication of information to the team whose start of work depends on the completion of a task or project by another team becomes vital for purposes of efficiency and successful completion. Pekerikli, Akinci and Karaesmen (2013) argue that information is very crucial for seamless and cost-effective operations within the construction industry. Further, Bankvall, Bygballe, Dubois and Jahre (2010) argue that effective communication of project-related information and effective coordination of information exchanges between team members working in different projects are very important for the success of a construction program.

Pekerikli, Akinci and Karaesmen (2013) argue that understanding information interdependencies is important in terms of making appropriate, effective strategic choices and decisions. Further, according to Pekerikli, Akinci and Karaesmen (2013), as construction projects get more intricate and the expectations of stakeholders get high, effective and efficient information exchanges become more pronounced. The researchers argue that, in order to achieve a construction programme success, there must be a formal approach to information interdependencies. Such as Incorporating information becomes indispensable where there are various intricate project interdependencies. An analysis of the literature reveals that where there are project interdependencies, information interdependencies are inevitable.

Klee (2015) and Warhoe (2013) emphasize that construction is a complicated composition of different interdependent processes that are planned and implemented at different levels of details by numerous experts. They argue that a construction program involves the use of various components that form different systems, which coalesce at interfaces. According to Klee (2015) and Warhoe (2013), at the interfaces, some project components interact with one another, some components do not go together, and others need a lot of time or space, mainly because of the in situ nature of a construction programme. The researchers conclude that, in all these interface relationships, ongoing interactions of knowledge and information interchange or transfer between different teams. Accordingly, the information interchange may be occasioned by the need to coordinate orders, legal references, reports on the status of previous task performed, or the need to piece together some missing

project information that is crucial for the performance of further tasks or projects within a construction programme.

Killen, Krumbeck and Kjaer (2007) argue that the ability to understand, communicate and manage different interdependencies within a programme is problematic to different projects teams, professionals and managers. Accordingly, the authors suggest that between-project communication is a significant part of the solution, which can be enhanced through appropriate management strategies. The between-project communication becomes crucial where there are high project interdependencies and where different stakeholders need to be involved at every level of project and information interdependencies, which are vital when dealing with factors that may hinder the successful achievement of various construction programmes.

Galvez, Ordieres and Capuz-Rizo (2015) posit that the sequence in which projects are ordered are important to the development of a construction programme. The researchers explain that the order in which the projects are undertaken is informed by the flow of information among the team members handling them and that the dependency structure matrix can be utilized in modeling the flow of information, based on various project interdependencies. The dependency structure matrix is an extensively used tool due to the fact that it enables the multifarious parts of a programme to be broken down, thereby simplifying the programme by sectioning it into smaller projects or tasks, identifying the interdependencies between them, and assigning the right resources to complete the whole programme successfully and efficiently (Galvez, Ordieres, and Capuz-Rizo, 2015).

Further, according to Galvez, Ordieres and Capuz-Rizo (2015), overlapping sequential project activities within a construction programme are common. Two-way information interchange among dependent projects or tasks is necessary (Galvez, Ordieres and Capuz-Rizo, 2015). Where there are interdependencies within a programme, they are likely to overlap sequentially, meaning that different projects need to be done or completed before the immediate commencement of others. In such a scenario, there must be an interchange of information between team members (Galvez, Ordieres and Capuz-Rizo, 2015). For instance, where the performance of a specific project is dependent on the completion of another, the predecessor team should communicate whether their project is complete or otherwise. Likewise, the team on a successor project should communicate to the team on the predecessor project as to their readiness to begin or otherwise (Galvez, Ordieres and Capuz-Rizo, 2015).

2.6 Communication in the Context of a Construction Programme

Apart from the relationship between communication and project interdependencies, researchers have also studied the link between effective communication and the success of programmes, especially construction programmes. According to Ceric (2012) and Muller (2007), information asymmetry is a scenario in which some parties are more informed than others. Accordingly, information symmetry has been defined as a scenario in which information has been distributed to all parties equally, so all involved parties are updated at the same time. Ceric (2012) contends that good communication, which involves information symmetry among all individuals and teams working on a project, is vital for success.

Communication during the implementation of a programme, is an essential management skill that every project manager is required to possess. According to Cheung (2014), Singh (2001), and Lester (2013), the process of management should drive both formal and informal communication at various levels within a programme or organization. Both formal and informal communication should include all activities and behaviors through which relevant information and project ideas are transmitted between project managers and team members.

Accordingly, Maria-Sanchez (2005) and El-Reedy (2012) argue that poor communication is one of the factors leading to project risks. Ramjugernath (2015) and Peh and Low (2013) point out that communication in a construction programme is spread across multiple fields, organizational levels, perspectives, and interpretations, making it complex. Ceric (2012) posits that different teams working on a project need to cooperate, share, organize, and integrate significantly large amounts of information in order to achieve project success. Achieving information symmetry is crucial in terms of ensuring effective communication throughout a project lifecycle, especially in situations where project and information interdependencies are relatively high.

Muszynska (2015) explains that project communication management enables project managers to ensure timely and appropriate generation, gathering, distribution, storing, retrieval and disposition of project information. According to Muszynska (2015), Jiuguang (2015) and Emmitt (2010), open and clear communication channels and approaches are needed among project planners, executors and in all levels of an organization to ensure successful projects.

Having effective communication plans, clear information distribution paths, project progress reporting, and mechanisms of effective sharing of information among project management teams and between project parties, clients and other significant stakeholders are important (Zou and Sunindijo, 2015).

Aiyewalehinmi's (2013) empirical study included a factor analysis of communication in the construction industry. The study found that construction productivity was positively correlated with the amount and quality of communication that flowed between individuals involved in the design and implementation of a construction project. The implication of this finding is that high levels of construction productivity are attributable to large amounts of high quality communication between project team members. A lack of high quality, effective communication can result in project failure. And Considering that a construction programme may have many projects going on, the failure of one project may lead to the failure of the entire programme. In many cases, such a failure is a function of poor communication management. Cheung, Yiu and Lam's (2013) study showed that ineffective communication was a reason for the failure of many construction programmes and organizations.

According to Cheung, Yiu and Lam (2013), effective communication requires a significant level of trust between and among project managers or personnel involved in the implementation of different components of a project. The researchers concluded that, if those who are involved in the implementation of a project trust each other, they will be more willing to share vital project information among and between themselves. Trust plays a major role in promoting effective communication within a programme. There is a beneficial relationship between trust, communication and project performance. However, it is important to note that there are still limited studies linking the three factors together. Further study is required to determine whether effective communication can be achieved through trust and whether a positive correlation between trust and effective communication will result in improved programme performance.

While underscoring the importance of communication in a project, Heldman, Baca, Jansen and Jansen (2007) argued that effective project managers spend more than a half of their time in communication. The researchers proposed that, in order to achieve effectiveness, communication should be planned at the commencement of a project. Further, Fwa (2005), Loosemore (2003) and Smith (2007) explained that communication planning involves a range of factors: specific people who need information and the time at which they need it; the type

of information people require in order to undertake certain tasks and; the goal of making a communication and how the information is supposed to reach the intended recipients. Consideration of these factors will lead to effective communication. Even though the suggestions have provided insight into how effective communication can be achieved, they have not adequately examined through research, particularly in the context of a construction programme.

A number of researchers have also focused on the diversity of project team members when studying ways in which the effectiveness of communication can be enhanced. Gido and Clements (2014), Winch (2012) and Zhou (2015) observe that diversity in a project team can be functional, organizational, cultural, geographical, age, or education level. Effective communication should take into account all these factors, lest there be a miscommunication, which may ultimately have a negative impact on specific construction projects or an entire construction programme. Effective communication that ensures project success should be sensitive to the dynamics and diversities of team members working in a given construction project or programme. Baker (2009) and Hielkema (2014) argue that project managers should effectively communicate through organizing meetings to discuss emergent issues, and should be always in contact with various principal stakeholders.

2.7 Communication Strategies for Successful Construction Programmes

Numerous studies have made it clear that some of the common causes of project failures include changes in the scope of projects, poor or inaccurate estimations in project planning phases, and poorly defined project goals and objectives. According to Dikbas and Scherer (2004), all these issues arise mainly due to bad or ineffective communication strategies or a lack of communication. As such, there are many studies concerning business or project communication strategies aimed at achieving organizational or programme goals and objectives. Kernbach, Eppler and Bresciani (2015) investigated the use of visualization in the communication of business strategies. The study involved 76 managers who were presented with visual metaphors, bullet list and temporal diagrams. Each subject was allowed to see only one representation format. The results of the study showed that managers exposed to diagrams representation of strategies paid more attention than those who were exposed to bullet lists. Those exposed to diagrams representations better recalled and agreed with the new

organizational strategies that those exposed to bullet points. Kernbach, Eppler and Bresciani (2015) concluded that the use of graphical representations as part of communication strategies is more effective in passing information to stakeholders than the use of bulleted texts are.

Construction programmes require many drawing and design activities to represent information regarding different projects or different components of a project. The use of images and graphic representation can be a vital part of an effective communication strategy in the context of a construction program. However, this kind of a study has not been done with respect to communication in the context of construction projects. Therefore, it implies that a further study is still needed to contextualize the study to the construction industry, especially construction programmes with complex project interdependencies.

Kiseilnicki (2011) studied the problems of organizing project teams in order to create conducive environments that enhanced team synergy and communication. Kiseilnicki (2011) came up with and sought to prove or disprove the hypothesis that, “the network communication systems avail the most effective framework for the management of projects.” According to the study outcomes, two issues hindered effective communication and led to challenges in project implementation. The first issue was communication roadblocks caused by external factors, such as delayed supply of necessary technologies, problems with project financing, incomplete documentation, changes in legal and regulatory frameworks, unplanned absence by some of the key project team members, and changes in the goals and objectives of an organization implementing a project. The second issue was communication challenges resulting from internal factors, such as inadequate communication, poor communication channels, lack of knowledge and experience in undertaking a project, interpersonal conflicts between different project teams or among project participants, and mistakes in project management strategies and processes.

Even though Kiseilnicki’s study (2011) focused on information technology projects, the outcomes provide insight into communication challenges that affect construction programmes. A similar study could help to establish internal and external factors hindering effective communication in the context of a construction programme, especially for individual projects with high levels of interdependencies. Understanding specific communication challenges would allow construction programme managers to diagnose communication problems and, consequently, come up with strategies to ensure effective communication for purposes of achieving different projects goals and objectives. Kiseilnicki concluded that

network communication strategies can be very beneficial to a project. As well, the study found that schedules and budgets can be communicated to project participants in the network system better than they would in a hierarchical system, thereby enabling earlier interventions where necessary.

One of the ways to ensure effective communication among project team members is to have project leaders with both interpersonal communication skills. Gushgar, Francis, and Saklou (1997) describe leaders' communication skills as the capability to interact efficiently with others at all levels inside and outside the organization. The importance of interpersonal communication skills for projects was underscored by Henderson (2008), who showed that project managers' interpersonal communication competencies were positively related to project productivity. This argument implies that, for an effective communication to exist in the first place in a programme, project leaders must have effective interpersonal skills. When a project manager or leader lacks interpersonal communication skills, the successful implementation of the project or an entire programme is likely to be unachievable. A project manager with interpersonal communication is able to coordinate with other project leaders to share information quickly.

Further, Culo and Skendrovic (2010) argue that project communication is the responsibility of every project participant. Every project participant should be able to understand the nature and progress stages of different projects they are working on and be able to provide accurate reports. Culo and Skendrovic (2010) emphasize that the design of the project communication strategy is the responsibility of the project manager, who will need to be competent in terms of project communication and planning.

Rapid exchange of information among different team members facilitates the achievement of project goals and objectives (Espinosa, Nan, and Carmel, 2015). According to Espinosa, Nan and Carmel (2015), rapid exchange of information is primarily achieved through conveyance. Further, they note that more exchange of information on project tasks results in more familiarity with ongoing tasks; this results in high rates of successful project completion. Effective communication can also be achieved through ensuring that information pertaining to projects is shared as fast as possible; this is especially applicable where there are high levels of project interdependencies within a programme (Espinosa, Nan and Carmel, 2015). Project teams must come up with strategies of communication that ensure instant transfer of information to relevant team members or project leaders. In this respect, Schwalbe (2015)

argues that technology can be used to facilitate the process of creating and distributing project information, when utilized effectively among project team members.

Schwalbe (2015) also argues that project leaders can organize project documents, schedules, and stakeholder feedback and concerns in electronic project management systems. Schwalbe (2015) explains that organizations can use cloud services and have backup plans, all of which facilitates information interchange in a project. Schwalbe (2015), Bontempi (2003), and Bee (2013) advise that organizations can adopt the use of appropriate software. Even though not many studies have been done to determine the extent to which various construction projects use software and technology to facilitate information interchange, especially where there are high project and information interdependencies, it is evident that technology has some benefits in terms of enhancing the effectiveness of communication for project successes.

Nicholas and Steyn (2008), Dykstra (2011), and Anumba and Wang (2012) have shown the successful use of technology, especially software systems, to facilitate communication and exchange of information among and between different teams. Important to note is the fact that many construction programmes bring together different professionals temporarily. In this regard, the use of appropriate standard technologies enhances quick exchange of information and enables team members with different professional backgrounds to share information. Such technologies can be used to facilitate effective communication in construction programmes.

2.8 Conclusion

This chapter reviews literature regarding communication in different programmes and projects, especially construction programmes. Construction programmes have both project and information interdependencies, which necessitates effective communication. Clearly, there is a link between project and information interdependencies and the level of communication required for successful implementation of different projects in a programme. High levels of project and information interdependencies mean the nature of communication that is required to ensure the success of projects is complex. The literature shows that construction programmes are characterized by high levels of project interdependencies. Accordingly, they require a complex approach to communication in order to make their coordination and implementation efficient.

However, not many studies have been done with respect to the specific strategies that can be used to enhance communication in the context of construction programmes. More studies are needed to establish how the effectiveness of communication can be enhanced to ensure the successful implementation of construction programmes, especially in situations where there are high project interdependencies.

2.9 Hypotheses

This dissertation proposes to investigate the following hypothesis.

Hypothesis 1: There is a positive relationship between information symmetry and different project teams and programme management team and effective communication in programme.

Hypothesis 2: There is a positive relationship project/programme manager interpersonal communication skills and effective communication in programme.

Hypothesis 3: There is a positive relationship between high levels of trust across the programme and effective communication in programme.

Hypothesis 4: There is a positive relationship between diverse nationalities in a programme and effective communication in programme.

Hypothesis 5: There is a positive relationship between programme team commitment to effective communication and effective communication in programme.

Hypothesis 6: There is a positive relationship between effective communication and effective coordination across programme.

Hypothesis 7: There is a positive relationship between effective communication and effective delivery of programme.

2.10 Conceptual Model

Factors for Effective communication

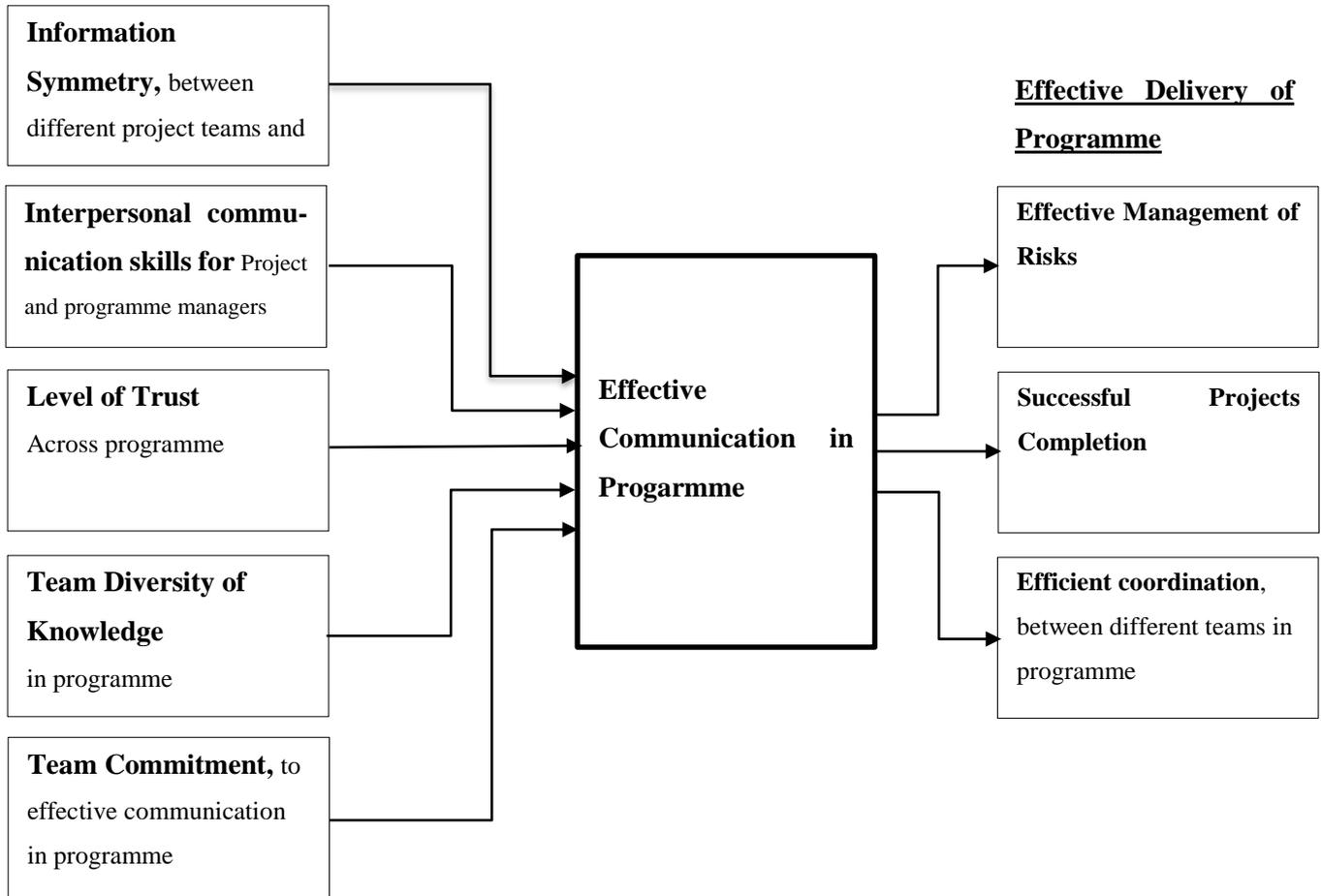


Figure 1: Conceptual Model

2.11 Conceptual Model Description

The literature review informed the development of the above conceptual model which presents the major factors that impact effective communication in a construction programme context. The model also illustrates the relationship between the two major variables which are effective communication and effective delivery of programme. As noted in the previous chapter, there is a positive relationship between effective communication and effective delivery of a construction programmes that are complex due to the level of projects interdependencies. Ceric (2012) emphasizes the importance of effective communication in project management

and programme management. Further, he links good communication with information symmetry among all individuals and teams working on a project or programme. As illustrated on the left side of the model, there is a positive relationship between information symmetry factor and effective communication variable.

Much of the literature also focused on project and programme managers' interpersonal communication skills. The importance of interpersonal communication skills in a project of programme has been underscored by Henderson (2008), who argues that project managers' communication competencies is positively related to project productivity. Increasing projects productivity enhances programme performance and therefore increases the probability of effective delivery of programme. As demonstrated on the left side of the model, there is a positive relationship between project and programme managers interpersonal communication skills as a factor and effective communication variable. The model also shows that there is positive relationship between high level of trust factor and effective communication variable. According to Cheung, Yiu and Lam (2013), effective communication requires a significant level of trust between and among project managers or personnel who are involved in the implementation of different components of a project or a programme. Thus trust has a positive relationship with effective communication .

As presented on the left side of the model diversity of knowledge and education backgrounds is positively impacts effective communication. Nonaka and Takeuchi (1995) highlight that teams whose individuals had various knowledge and education backgrounds appeared to have better performance, because diversity of knowledge smoothed exchange of information and enhanced communication from various perspectives. The result of a study conducted by Earley & Mosakowski, (2000), tend to prove this point of view. Effective communication should account for diversity, which can have a positive impact on construction projects and programme success. last on the left side the model illustrated positive relationship between team commitment to effective communication and effective communication. In this regard Kiseilnicki (2011) concludes that organizing programme management team in a way that would create encouraging environments will encourage team commitment to communicate effectively with each other's.

The right side of the model illustrated positive relationship between effective communication and effective risk management. In this regard, Maria-Sanchez (2005) and El-Reedy (2012) highlight that effective communication between different projects teams in a

programme decreases risks and increases the probability of effective delivery of programme. Furthermore, Aiyewalehinmi (2013) did a factor analysis of communication in the construction industry and found that construction productivity is positively correlated with the amount and quality of communication that flows among individuals who are involved in the design and implementation of a construction project.

The model also illustrated positive relationship between effective communication and efficient coordination between different teams in programme. According to Zayyana and Akintola (2009) state that effective communication is a vital part of a successful programme management and effective communication allows proper coordination between different project teams in a programme. They further state that the success of timely programme delivery is due to the proper coordination and alignments between the interdependent projects within the programme. Bankvall, Bygballe, Dubois and Jahre (2010) have advanced the view that effective communication of project-related information and effective coordination of information exchanges between team members working in different projects are very important for the success of a construction programme.

The last relationship illustrated on the model was the positive relationship between effective communication and project successful completion. In this regard, Espinosa, Nan and Carmel (2015) state that rapid exchange of information among different team members facilitates the achievement of project goals and objectives. In the literature, we clearly noticed that there is a positive relationship between effective communication and effective delivery of programme. The same has been concluded by Yiu and Lam (2013), whose study results showed that ineffective communication was a reason for the failure of many construction organizations, much less programmes.

3 Methodology

3.1 Introduction

This chapter describes the qualitative research methodology used for this research and explains why this research methodology was selected. In addition, the chapter presents the source of data, the way the data has been collected, and the method of analysis and limitations.

3.2 Conceptual Framework

Programme management is a very common practice in construction industry. Organizations use a programme management approach to better utilize resources and to achieve strategic goals. Project interdependencies in a construction programme involve numerous parties and makes processes more complicated. Therefore, effective communication management is very important for managing interdependencies and for programme success. Hence, investigating effective communication for management of construction programmes is very important.

The main purpose for this research was to investigate effective communication for management of project interdependencies in construction programmes. Two case studies were selected for this dissertation and data was collected from two different organizations. Each programme studied had different scopes and environments, as well as different kinds of clients and stakeholders.

A qualitative research method was used to facilitate research in the field, including data collection, observations, and face-to-face interactions with people. Moreover, this methodology allowed the researcher to concentrate on organizational procedures related in particular to the case studies. The qualitative methodology allowed the researcher to have direct interaction with programme teams and managers. It also allowed the researcher to be exposed to more people within the programme and to access programme documents, which provided historical data to support the study.

3.3 Population Sample

Large construction programmes were selected as case studies for this research. The first case study was of a master planning mix use programme developed by a private development and real estate company in Dubai. The programme consisted of: six different projects for construction of 2700 villas including civil, MEP works, internal and external finishes; another two projects for construction and operation of infrastructure works including utilities such as potable water, sewers, irrigation, electrical network, pump stations, and roads; six more projects, including four projects for construction of twenty buildings, seven floors each and two projects for construction of seven buildings, twenty-eight floors each; and last, two main electrical substations. For the purpose of this research, three projects were selected to represent the sample of this programme. The first project was a construction of 500 villas; the second project was a construction of four buildings; and third project was the infrastructure works in the same area.

The second case is a master planning mix use development including industrial projects developed by a semi-government organization in Dubai. The programme consists of two infrastructure projects including utilities such as potable water, sewers, irrigation, electrical network, pump stations, and roads; seven projects for buildings over seven labour cities each labour city consist twenty-six buildings, five stories each, and including all the civil works, MEP works, external and internal finishes, testing and commissioning. There is also a project for construction of three warehouses including all civil and MEP and finishes works. For the purpose of this research, three projects were selected to represent a sample of this programme. The first project was the construction of labour city number one; the second project was the construction of three warehouses; and the third project was the infrastructure works in the same area.

Interviews were conducted with the programme managers of the case studies. Approvals were provided from programme managers to allow the researcher to meet and interview three project managers from programme management team. Accordingly, interviews were conducted with three different project managers from each programme. Access to historical data and reports were provide from the programme management team for both programmes.

3.4 Analysis tool

A conceptual model was developed, informed by the literature review. Data collected through interviews, records, historical information, reports and site observations were examined against each factors in the conceptual model.

3.5 Data Collection

The sample of this study covers two different programmes from two different organizations. Interview questions were developed regarding the factors and variables indicated in the conceptual model to ensure sufficient data for research objectives. Accordingly, interviews were conducted with two programme managers and six project managers (three from each programme).

The data was collected through different tools and from programmes historical data. The main tool was face-to-face interviews and site visits and observations by the researcher. Company websites were investigated for more information regarding the programmes. Data collection was split into two levels: first, programme managers, and second, project managers in the programme; and therefore, two different questionnaires were developed as follows:

1. Programme manager questionnaire.

- a. Within projects to which extent is timely information shared effectively? Do you find sometimes some projects fallout? What do you do to ensure project teams receive the necessary information?

This question investigated information symmetry, across the programme team.

- b. What are the different communication practices that you use in your programme? To which extent are these practices effective?

This question addressed the level of the programme manager's communication skills.

- c. To which extent do you plan your programme based on information received from other stakeholders in your organization or from stakeholders within the programme?

This question addressed the level of trust between programme manager and other stakeholders in the organization, and between programme manager and stakeholders in the programme.

- d. To which extent do members of your team have different education backgrounds? To which extent do they have different knowledge? To which extent does the diversity of knowledge in your team impact your team communication effectiveness?

This question investigated the diversity of knowledge and education backgrounds in the programme management team and the impact of this diversity on effective communication between team members.

- e. To which extent do you receive timely information from other stakeholders within the organization? Do you normally specify a deadline to your team or stakeholders when you request a report, information or approvals? Do you receive requested reports, information or approvals by deadlines specified?

This question investigated commitment at two levels. First, commitment from other stakeholders within the organization to share information on time. Second, commitment from the programme management team to send to the programme manager on time reports or information he requested.

- f. To which extent are programme team members aware of the latest project design drawings? To which extent are team members in different projects aware of other project schedules?

This question investigated the level of efficient communication used in the programme between project managers and other project managers and team members in the programme.

- g. Can you describe how effective risk management is in your programme? What is the current situation of interdependent projects? Are there any delays? Are there any additional costs to be paid to contractors? Did your team review variation orders? What is the

percentage of variations in the entire programme? When handing over projects, are there usually snags? How long in average takes your team to rectify problems’?

This question investigated programme risks, which will provide an indication of the effective delivery of the programme. It also investigated the current situation of the programme in terms of time, cost and quality. The variations and the number of variations per month will give us an indication about the level of coordination between design team and implementation team, and between different project teams in the programme. The snags and the period takes to rectify them gives an indication about the quality; fewer snags and less time required to rectify the problem will result in better quality and vice versa.

2. Project Manager questionnaire

- a. How effectively is information needed from other projects communicated? To what extent is information updated across the project team?

This question investigated the information symmetry, across the project team.

- b. What are the different communication practices that you adopted in your project? To what extent are these practices effective?

This question investigated the level of the project manager’s communication skills.

- c. To which extent did you plan your project or subsequent activities in your project based on information you received from other project managers or stakeholders in your programme?

This question investigated the level of trust between project manager and other project managers or stakeholders in the programme.

- d. To which extent does your team have different education backgrounds? To which extent do they have different knowledge? To which extent does the diversity of knowledge on your team impact your team communication effectiveness?

This question investigated the diversity of knowledge and education background in the project management team and the impact of this diversity on effective communication between project team members.

- e. To which extent do you receive timely information from other project managers whose projects are interdependent with your project? Do you normally specify a deadline to your team or stakeholders when you request a report or information from them? Do you receive reports or information requested by the deadlines specified?

This question investigated the commitment on two levels. First, the commitment from other project managers or other project teams in the programme to share information with the project manager or his or her team on time. Second, the commitment of project team members to send reports or information requested on time.

- f. To which extent do you think your team members are aware of the latest design drawings? To which extent are team members aware of design changes?

This question investigated the level of efficient communication between project manager and project team members.

- g. Can you describe how effective risk management is in your programme? What is the current situation of the project? Are there any delays or additional costs to be paid to contractors? Did the consultant send you a log of noncompliance reports? How many noncompliance reports completed so far? Did your team review variation orders? What is the percentage of variations in your project?

This question investigated project risks, and provides the current situation of the project in terms of time, cost and quality. The variations and the number of variations per month indicate the level of coordination between the design team and implementation team in the project. The noncompliance reports and the period takes to complete them indicates quality. The fewer noncompliance reports and less time taking to complete noncompliance reports leads to better quality and vice versa.

3.6 Limitations

This research had several limitations. First, little literature was found on the subject of project interdependencies. It was also difficult to find literature addressing effective communication and project interdependencies together. Further, few studies addressed programme management, especially related to construction. Another limitation was the time constraints which prevented the researcher from addressing more case studies. The geographical limitation was also important, as this research only covered case studies in the UAE. Therefore, further researches to cover more case studies on this subject is recommended.

3.7 Summary

The study utilizes a qualitative research method. The study starts by identifying the definition of the programme and project interdependences. It also investigates the major factors impacting communication in the construction industry. The literature review addressed the importance and problems of communications in the construction industry and the impact of effective communications on the effective delivery of the programme. The literature begins by highlighting the theories of programme management and communication in the construction industry in general. And gradually, the study focuses on project interdependencies in a programme and communications between different project teams. As a result of the literature review, a conceptual model was developed and utilized to analyse and examine the case studies.

The conceptual model illustrated the major factors impacting effective communications in the programme. The model also illustrated the relationship between effective communication and the effective delivery of the programme. There is a positive relationship between information symmetry, programme/project manager communication skills, trust between the team, diversity of knowledge in the team, team commitment to communicate and effective communication in the programme. On the other hand, there is a positive relationship between effective communication and the effective delivery of the programme. Two large construction programmes were selected as case studies for this research. Research limitations were identified, the major challenges were the little literature on the subject of project interdependencies and programme management, especially related to construction.

4 Case Studies

4.1 Introduction

This chapter covers two large construction programmes presented as a case studies for this research. The first section gives brief description about each programme. second section identifies the projects in the programme and provides brief scope of works for each project. third section clarifies the level of interdependencies between the projects. And the last section provides comprehensive data analysis taking into consideration the factors illustrated earlier in the conceptual model.

4.2 Case Study One

4.2.1 Programme Brief

The programme is a full development of 120 hectares of land. The programme consists of 25 clusters of land, with a total of 2700 high quality row houses and villas, in two different communities. It is located in a strategic position in Dubai, with easy access to arterial road networks. Half of the villas faced park district. And the second half of the villas faced the Golf Island, which is ac community provides an environment of luxury villas, most with either frontage backing onto the golf course or water landscape. Community precincts contain facilities arranged around local plazas, which house a variety of functions such as mosques, clinics, schools, nurseries, gyms, post offices, restaurants and local grocery shops.

4.2.2 The programme consists of the following :

Six different projects for the construction of 2700 high quality row houses and villas, with six different main contractors, and more than 20 subcontractors and suppliers for different trades and disciplines, as well as two consultants. The client had his own management team, created to cover all technical and management aspects such as design, planning, commercial, and quality. The two consultants are responsible for reviewing engineering submittals,

responding to contractors' clarifications, checking work at site, coordinating works between different contractors in the same area and overseeing different progress of works.

The whole land is divided two areas in terms of infrastructure works. There are two different infrastructure projects awarded to two main contractors. The infrastructure main contractors have more than four infrastructure subcontractors. One consultant supervises villas and another two consultants supervises infrastructure projects. There are also two different main contractors building two electrical substations; under these main contractors, there are four subcontractors and one consultant supervises the substations.

In addition, there are six more projects, four projects for construction of twenty buildings seven floors each and two projects for construction of seven buildings, twenty-eight floors each. There are two supervision consultants, each one managing ten of the seven-floor buildings. There are four different main contractors, each responsible for the construction of five buildings. Under each of the main contractors there are more than three subcontractors. There are also two main contractors responsible for construction of the twenty-eight floor buildings, one responsible for construction of four buildings and the other responsible for construction of three buildings.

4.2.3 Projects interdependencies

There are complex interdependencies in this programme due to the huge amount of works. There are interdependencies with suppliers: individual supplier supply materials to more than one project at a time for this programme. Moreover, there are interdependencies in the arrangement and coordination between infrastructure works and villas and buildings, since projects are being constructed at the same time in one area. For example, building foundations cannot start until infrastructure deep services finished. The other major interdependencies are between delivery and installation of electrical cables, and villas completion and readiness to receive power and water.

4.2.4 Analysis

The conceptual model shown in chapter two was used to analyze the data collected from the interviewees. This section examined, the major factors that impact effective communication, communication effectiveness in the programme and effective delivery of the programme.

1. Major factors that impact effective communication

a. Information Symmetry

Different questions were addressed to the programme manager and project managers to evaluate information symmetry across the programme management team. Information symmetry, as defined in chapter two, occurs when all the team members are aware of the latest updated information on time. The programme manager shared that there was no comprehensive system to share information across the team. Instead, they depend on document controllers to distribute information, and on weekly meetings to ensure that information reaches all project managers. The programme manager added that he found sometimes some project managers did not have the latest updated information. We noticed that there was no proper system to share the information across the programme management team. And also no proper follow up to ensure that information was distributed to all team members.

The three project managers were asked how effectively they received the information they needed from other projects and whether or not this information had been updated across the team. The three project managers' answers varied: one said "I received the information"; the other two said "no We didn't received the information automatically, there is no comprehensive or standard system. The project managers indicated that they usually make a request for the information, whenever, they need data from other projects within the programme. Two project managers said, "usually site team are more updated than office team"; one project manager said, "when I received the information I used to distributed it immediately to my team". We found that due the absence of a comprehensive and standard system each project manager used his own way to share information across the team. And there was no proper follow up or checking system to ensure that data distributed to all relevant team members on time . Therefore, We concluded that there is no information symmetry in the programme management team.

b. Interpersonal communication skills

Interviewees were asked what different communication practices they adopted in their programme. Programme managers answered that they used very normal communication methods, nothing different than normal and nothing specially customized for this programme. Therefore, we found due to the fact that only normal and well known methods of communication were used in the programme, the communication skills for the programme manager can be rated normal. The three project managers had almost the same answer: they used emails, memos, letters and meetings, which again are normal tools and methods used by all people for communication. We found due to the fact that no different communication practices were employed by any of the project managers. And none of the project managers applies any different communication practices in their projects. Therefore, We concluded that the programme and project managers didn't have interpersonal communication skills.

c. Level of trust across programme

An indirect question was used to investigate trust. The researcher asked interviewees, to which extent they planned their programme based on information received from other stakeholders in the organization or from external stakeholders. The programme manager answered, "I have to check myself any information before I depend on it in making any planning for my programme"; the programme manager was very transparent; he added that "trust in this organization is not more than 50%". It is clear from the programme manager answers that the level of trust between the programme involved parties is very low.

Nevertheless, the answers received from the three project managers support the programme manager's statement about trust. The three project managers also indicated that if they received any information from other project managers or stakeholders, they always went and check by themselves; not only that, but also make their own analysis and compare it with information that they received and then make their plan accordingly. although project managers were informed during the interview that this question was to measure the level of trust they still insisted that they aren't depends on the information received by any parties until they checked it themselves. Therefore, We concluded that there was no trust across the programme involved parties.

d. Team diversity of knowledge

Programme manager's answer indicates that there was diversity in education, knowledge and experience in the programme management team. However, he stated that due to similar knowledge, education and experience of the villas project managers he found difficulties in communication. We noticed that the programme manager answer gives an indication that across the entire programme management team there is diversity but in villas projects there was no diversity in education, knowledge and experience. Therefore, We concluded that there is a partial diversity of knowledge within the programme management team.

On the other hand, regarding project teams, two project managers said that their project team almost has similar education background and does not have big difference in knowledge and experience. They added that the majority are engineers and from consultant backgrounds. However, the third project managers who is the buildings project manager said that the majority of his team do have different education, experience and knowledge backgrounds. We found different answers to this question from the three project managers, that was supporting the above made conclusion that there is partial diversity of knowledge in this programme. As identified earlier in the case study brief this was very large programme with large management team. So partial diversity means that in some projects there was diversity of knowledge within the team and in another projects there was no diversity of knowledge within the programme management team.

e. Team commitment to effective communication

The programme manager answers can be divided into two levels: one is the commitment from stakeholders and other stakeholders in the organization, where he clearly said that their commitment to share information and fulfill specified deadlines is not more than 50%. And the other level is the programme management team, where the programme manager gave 80% as a rate of commitment from the team to send the information or reports as per the specified deadlines. We noticed that the rate of commitment from the stakeholders and other stakeholders in the organization was very low. And since such a programme is highly dependent on information from external stakeholders and other stakeholders within the

organization, We concluded that across the programme involved parties there was a very low rate of commitment to effective communication.

On the same subject, one project manager said “I only received the information when I asked for it” and regarding on time or not “he added that 70% of the cases it is not on time”. The other project manager said, “ I received regular reports but most of the time I did not find it comprehensive and covered all the information I need, so I used to send a request for information to other team members, he also added most of the cases I received the information on time from my team and late from other team members or other project managers”. The third project manager indicated that he received regular weekly reports and most of the cases were on time. The above mentioned answers present different scenarios. Therefore, We noticed that such situation indicated that there was no standard and no commitment from all parties involved in the programme to share the information on the specified deadlines. Therefore, We concluded that there is no full commitment to effective communication in this programme between involved parties.

2. Communication effectiveness in the programme

It has been noticed from the programme manager answers that decision and information regarding the design were changed very often by the management. Moreover, the programme manager made a statement that “sometimes changes agreed by the senior management without even me involved and I came to know about it later”. When such statement was made by the programme manager then, it gives a clear indication that the communication approach deployed in the organization was not effective.

On the other hand, the answers from two project managers indicated that not all of their team were always aware about the latest shop drawings or design changes. The third project manager indicated that his team was always aware about the latest shop drawings. The researcher addressed this question just to examine how effective communication was in the project between different team members and in the programme between all programme involved parties. We noticed that the cases and the explanations provided by the project managers and programme manager indicated that the communication methods used in the programme were not an effective communication approach. Therefore, We concluded that the communication between programme involved parties was not effective.

3. Effective delivery of programme.

a. Effective Management of Risks.

The programme manager answers indicated that the management of risks in this programme was not appropriate. We found that risks in this programme managed by only maintaining a risk register and makes a regular updates. On the other hand, project managers state that “risk management is not very effective in our projects”. Project managers clarified that the reason behind the absence of effective risk management was dynamic design changes happened from time to time by the management. They added that “in such environment it is difficult to apply proper risk management”. Due to the above commentaries by project managers, We concluded that there was no effective risk management applied in this programme.

b. Successful Project Completion

The information provided by the programme manager indicated that there were delays and variations in the projects, as well as quality issues. The programme manager rated quality in general in the programme seven out of ten percent. On the other hand, project managers all admitted that there were delays in the projects. For instance, in infrastructure the delay was about one year due to the coordination with other projects in the programme. In villas and buildings the delays were ten to six months. The three project managers answers indicated that there were a number of variations still under process. They also indicated that the number of quality noncompliance reports varies from project to project. For example, more than 35 noncompliance reports were sent by the consultant to the contractors for rectifications in the building projects and another undefined number sent to villas contractors.

The above mentioned information provided a clear indication about the performance of different projects in the programme. Moreover, the historical data shared with the researcher shows severe delays in the projects. Therefore, we concluded that the time performance indicator in the programme was very low, as well as the cost performance indicator was low due to the fact that there were a number of undefined variations in all the projects. The quality performance indicator could also be rated very low as per the information provided by project managers on a number of quality noncompliance reports in their projects and as per the quality rates provided by the programme manager.

c. Efficient coordination between different teams in programme

The programme manager and the project managers indicated that they make weekly progress meeting to ensure coordination between their projects were considered. The researcher asked if there was a comprehensive master schedule that covered all the projects and presents the level of coordination between the different projects and to which extent this master schedule is reliable. The programme manager and the project managers answered that “there is a master schedule updated regularly but some time not presents the facts due to the dynamic decision from the management”. We found that there were numerous number of master schedules, and the team was not aware about which one was the latest. Therefore, We concluded that coordination between the programme involved parties was not effective.

4.2.5 Conclusion

The results of all effective communication factors showed ineffective implementation of communication in this programme. The result of the effective communication variable questions also gave negative indication, i.e. there was no effective communication across involved parties in this programme. This conclusion confirmed the relationship proposed in the conceptual model, which emphasized that when the effective communication factors such as, information symmetry, level of trust, communication skills, diversity of knowledge, and commitment to effective communication were considered, then, there are effective communication across the programme involved parties.

Although these circumstances the programme was still under construction and few projects were just recently completed. However, performance of the major factors that impact effective delivery of programme were very low. The recently delivered projects in this programme were completed after the planned completion date of more than six to twelve months. There were also additional costs and an undefined number of variations were still under process. Moreover, there were problems and the quality rates given by the programme manager were very low. The data analysis showed that the delivery of the programme will have late projects completion, additional cost to be paid by the client, and quality problems, as well as there was absence of effective risk management. The reports and historical data shared with the researcher showed that a majority of the projects in this programme were delayed, not only the three projects discussed in this dissertation. Thus, the delivery of the programme will not be effective. Both conclusions as such, confirmed the relationship between the major two

variables effective communication in programme and effective delivery of programme as indicated in the proposed conceptual model.

4.3 Case Study Two

4.3.1 Programme Brief

This case study represents an industrial development programme. The development is in one of the emirates of UAE. The programme intended to deliver an industrial district. Upon completion, it will spread across approximately 45 square kilometers of prime industrial land.

The programme consists of two projects for infrastructure, one project for a sewage treatment plant, one project for a civil defense station, two projects for two electrical substations, seven projects for seven labour cities, with each labour city including twenty-six buildings, five stories each, and three projects for three warehouses. Each project was handled by a different main contractor. There was one consultant responsible for supervision of infrastructure works. Another supervision consultant responsible for the labour cities projects and one more supervision consultant responsible for the warehouses projects.

The scope of works of the infrastructure projects was divided by areas. The first project was road and infrastructure along spine road serve all the projects, labour accommodation area and warehouses area including road works, sewers, drainage, firefighting, street lights, potable water, and irrigation. The second project was road and infrastructure for sub roads along the spine road and remaining areas for other development than labour accommodation and warehouses, including, road works, sewerage, drainage, firefighting, street lights, potable water, and irrigation. The programme was managed by a management team from the client side, and a project management consultant and supervision consultants.

4.3.2 Projects interdependencies

The interdependencies in this programme were between the infrastructure works and buildings and warehouse projects. Infrastructure deep services had to be finished prior to starting construction on the buildings, as well as for buildings to be up and running, infrastructure works had to be completed and all roads had to be ready for traffic use. Unlike

the previous case study, there were interdependencies in the resources in this programme. There was one contractor handling more than one project at the same time and there were specified deadlines and completion milestones for each project. Thus, this contractor had to arrange to organize the resources between two different projects and to coordinate with two different project managers. The project managers of the different projects were also required to have proper coordination and effective communication between them and their teams to ensure effective sharing of resources for the benefit of the two projects' targets and objectives.

4.3.3 Analysis

The conceptual model shown in chapter two was used to analyze the data collected from the interviewees. This section examined, the major factors that impact effective communication, communication effectiveness in the programme and effective delivery of the programme.

1. Major factors that impact effective communication:

a) Information Symmetry

Different questions were addressed to the programme manager and project managers to evaluate information symmetry across the two levels. The answers provided by the programme manager indicated that there was a well-established system to share information across the team. He added that they were depends on a pre-developed manual wherein, comprehensive communication protocol, process and procedure, forms and formats were provided. the manual was distributed to all of team members. The programme manager added that usually he does something he call it brain mapping form to check that information was shared across all team members and stakeholders. We noticed that there are well-defined methods and procedures to share information with the team members and stakeholders. Therefore, based on the programme manager answers and the above analysis, We concluded that there is information symmetry in this programme across programme involved parties.

On the other hand, The three project managers were asked how effectively they received the information they needed from the other project and whether this information was updated across the team or not. The answers received from the three project managers were

almost the same. They all said that they received regular reports including all the information required and this reports were distributed immediately through the system as per the department manual procedure to all team members. We noticed that due the available standard system all project managers share on time information with their teams. So, all team members across the programme received updates on the information at the same time. Therefore, We concluded that there is information symmetry in this programme, across programme involved parties.

b) Interpersonal communication skills

Participants were asked what different communication practices they used in their programme. The Programme manager answered that he used different practices such as brain mapping, where he said, “ I make matrix to ensure that information received by relative team members”. The department manual also considered different practices as it clarifies programme communication process and procedures. In addition, the social activities they usually did with the team to facilitate communication also considered different practices. We noticed that, there were new practices used in this programme by the programme manager. Accordingly, We concluded that the programme manager had interpersonal communication skills .

The same question was used to investigate the interpersonal communication skills of project managers. The three project managers had almost the same answer, which presents that they used emails, memos, letters and meetings, which are the normal tools or methods used by all people for communication. However, the three project managers mentioned that the different things that they normally did in this programme were that they made social activities with all team members after working hours, and they also made regular celebrations with all team members during working hours. Their argument was that this practice broke down barriers between different projects team members and made individuals more willing to communicate with each other during working time. Due to the fact that the project managers applied social practices to enhance communication between team members in their projects and that was common practice across the programme, therefore, We concluded that the project managers in this programme had interpersonal communication skills.

c) Level of trust across programme

An indirect question was used to investigate trust. The researcher asked the interviewees to which extent they planned programme based on information received from other stakeholders in the organization or from stakeholders. The programme manager answer was “although trust was very high but I checked the information and I ensure that the information received from reliable source before I make any planning”. It was very clear from the programme manager answers that the level of trust across programme involved parties was very high. We concluded that there was a high level of trust in this programme but nothing was taken for granted.

The answers received from two project managers supported the programme manager statement about the trust. They said that they normally made their plans based on information and reports they regularly received from other project managers in the programme and even from stakeholders. The third project manager’s answer indicated that there was trust but the information received from other project managers or stakeholders still had to go through a cross check process before being used for planning. Checking information is a good idea. Two project managers indicated that they used the information received from other project managers as is. Therefore, We concluded that there was a high level of trust across involved parties in this programme.

d) Team diversity of knowledge

The programme manager stated that there was major diversity in education, knowledge and experience in the programme management team. The fact that a majority of the team had international backgrounds enhanced communication across the team. Therefore, We concluded that there was diversity of knowledge at the programme management team.

The three project managers also indicated that there was a diversity of education, knowledge and experience on their teams. The fact that the majority of project teams had international previous experience and came from various international organizations. We noticed that there was a diversity of education knowledge and experience in the projects teams level. Therefore, We concluded that there was a diversity of education, knowledge and experience across the programme management team.

e) Team commitment to effective communication

The programme manager indicated that there were regular weekly and monthly reports and whenever information was requested from any parties internally within the organization or externally always there were specified deadlines and in most cases information or reports were received on time. We noticed that the rate of commitment from the stakeholders and other stakeholders in the organization seemed to be very high. Therefore, We concluded that across the entire programme management team there was a commitment to effective communication.

Two project managers indicated that there was a commitment to sharing information and maintaining effective communication from all programme team members and stakeholders. However, the third project manager indicated that although reports and information were regularly received, he rated 80% of cases were received on time. We noticed that the two project managers and programme manager answers were aligned. Therefore, We concluded that there was commitment to effective communication in this programme.

2. Communication effectiveness in the programme

The programme manager that, he was very confident that his team used latest design revision and latest approved shop drawings. We noticed that the high level of accuracy in the equality control procedure presented by the programme manager ensured team members were fully aware about the latest approved design/shop drawings. Therefore, We concluded that the communication approach in this programme was very effective.

At the project level, the answers from two project managers indicated that communication was very effective, as all of their teams were always aware about the latest design changes and latest shop drawings in the project. The third project manager answer indicated to a certain extent that the communication was effective. He stated that “ the communication procedure was 80% effective”. The information provided by the project managers and programme manager indicated that the communication methods used in the programme were effective.

3. Effective delivery of programme.

a. Effective Management of Risks.

The programme manager indicated that there was appropriate and effective risk management in the programme. He said that “The risk was covered through a risk register and risk plan”. He added that the “risk plan was one of the crucial requirements that each project manager has to create, implement and submit for approval, in a regular basis, it was very effective way of managing the risks.” We concluded that since there was a comprehensive risk management plan covers all the aspects of risks. Therefore, there is effective management of risks at the programme management team level.

The three project managers answers were similar and indicated that there was no appropriate risk management standard. We noticed that the project managers’ feedback was not very positive, though one of the project managers mitigated risks in his project. Therefore, We concluded that there was risk management in this programme but it was not very effective.

b. Successful Projects Completion

The programme manager indicated that there were acceptable delays in the projects. The programme manager described them as a “few delays”. Moreover, in this programme the researcher had a chance to see the programme history and previous reports, which showed that the delay was very minimum in the range of 1-3 months only. We noticed that 1-3 months is an acceptable range of delay in such a programme. Additional costs (10-15%) reported by the programme manager indicated that there was considerable value of additional cost. The researcher investigated the additional cost issue further, reviewing documents and previous reports, and found that the main reason behind the large variation was management’s decision to reschedule part of the project due to the financial crisis at the end of 2008. This decision made the company pay more money to contractors afterwards when the company decided to proceed with construction again. With regard to the quality of the works in the programme. The researcher asked a question about the level of the quality in the competed projects in the programme. The programme manager answer indicated that they have used worldwide international consultants and contractors and therefore they assured the quality standard.

Answers provided by the three project managers indicated that there were minor delays in their projects, which they all described as ranging from 1-3 months. Their answers also indicated that there were additional costs due to variations issued to contractors to add some missing works. There were also additional costs due to omitting part of the works due to the financial crisis at that time. Thus, reassigning the same work after two years this incurred additional preliminary cost. The quality level was examined through the number of quality noncompliance reports normally issued by consultant to contractors. The project managers indicated that the number of the noncompliance reports were very limited, therefore, We concluded that the quality in the programme was high.

The above analysis provided a clear indication about the performance of different projects in the subject programme. We concluded that the time performance indicator in the programme was high due to the fact that the delay was very minor, however, the cost performance indicator was low due to the fact that there were a number of variations, and variation percentages were high: around (10%-15%) for the entire programme. The evaluation of the quality performance indicator was high due to the fact that the number of quality noncompliance reports in the projects were very minimal. Therefore, We concluded that overall programme performance was high and projects were successfully completed.

c. Efficient coordination between different teams in programme

With regard to coordination between team members, the programme manager and the project managers focused on the social activities that they made sometimes during working hours and even after working hours. Moreover, the progress meetings that they normally conducted with all team members facilitated coordination between all involved parties in the programme. There were monthly meeting where all project managers, programme manager with all internal head of departments in the organization and the organization vice president met together for more than two hours, discussed and resolved many issues regarding the programme. The researcher asked if there was a comprehensive master schedule covering all the projects and presenting the level of coordination between different projects, and to which extent this master schedule was reliable. The programme manager and the project managers answered that “there is a master schedule updated regularly and they used it to communicate dates with all stakeholders, the same has been updated through a meeting with all project managers and involved stakeholders in a weekly basis”. Therefore, We concluded that the

approach to coordination was very helpful. They considered many dimensions such as social networking, meetings with all stakeholders in regular basis, and meeting with the organization vice president once a month. We noticed that all these practices together enhanced coordination among the programme involved parties.

4.3.4 Conclusion

All factors that impacted effective communication specified in the conceptual model in this programme showed positive outcomes. Moreover, the results of the effective communication variable also gave positive indication. Hence, both results regarding evaluation of effective communication in this programme were aligned. Therefore, these results confirmed the positive relationship between the factors that impact effective communication and the level of effective communication in the programme as proposed in the conceptual model.

All projects in this programme were completed and handed over. This situation allowed the researcher to be exposed to more data, and increased the level of data accuracy and enhanced the analysis. The performance of the major factors that impact effective delivery of the programme were high, except the part related to effective management of risks, where the results showed low performance. However, the quality and time performance in the projects as well as coordination effectiveness were very positive. We noticed that additional costs paid in this programme were justifiable. The fact that the programme was under full construction during financial crisis, therefore, rescheduling part of the projects to be able to deliver other parts in such a critical situation is a strategic approach to overcome the crisis and ensure effective delivery of the programme. Therefore, additional costs incurred afterwards were value added variations resulting in effective delivery of the entire programme later. Thus, positive results around effective communication and effective delivery of the programme were in line with each other. Both conclusions confirmed that there was a positive relationship between the major two variables as indicated in the conceptual model.

5 Discussion and Conclusion

5.1 Discussion

Two large and different programmes were selected by the researcher as case studies in order to investigate the level of communication effectiveness in each programme and to examine the relationship between effective communication and effective delivery of the programme. The conceptual model presented academics' opinions on factors impacting effective communication and clarified the relationship between effective communication and effective delivery of programme.

In case study number one, data analysis was made to examine the impact of each factor on the effective communication in the programme. We noticed that information was distributed to the team members by emails or through the document controllers. The way of distributing information and the programme manager and project managers responses clear indicated that, in many cases, some team members have more updated information than others. Sometimes, project managers did not have the latest information about their projects. On the contrary, in case study number two, there was a very established system to share information relative to all team members on the same time. In addition there was a manual clarified all communication process and procedures in the programme. The responses from the programme manager and project managers indicated that the programme involved parties were very committed to sharing information.

The case study number one, team members were using very ordinary methods of communications, such as emails, memos, meetings and letters. Although, programme manager and his team recognized that there was communication problems in the programme, however, they did not think to introduce new practices to enhance communication. They were used to living with the situation and blaming their market driven organization and management who kept changing things. On the other hand, the participants in case study number two introduced different practices to improve communication and coordination. We noticed how this team introduced several practices such as social activities, celebration parties between team members, monthly meetings between team members and stakeholders and organization vice president. Programme management team in case study number two were very effective to introduce new ideas to enhance communication. However, programme management team in

case study number one did not think about any ideas to enhance communication between their team.

In both case studies, we found that the diversity of team knowledge and experience were almost the same. However, there were major differences in the level of trust between the two case studies. The results provided earlier in this dissertation showed that for case study number one, trust between team members was low and trust between the programme management team and other stakeholders within the organization was very low. In case study number two, we noticed how the team checked any information they received from other team members or stakeholders prior to using this information for any planning in their project. When, the researcher mentioned trust during the interviews, all project managers described it as very high.

Team commitment to effective communication in case study number one was not effective. The programme manager and the project managers were usually received regular reports, however, most of time they did not find all the information they need in the report. Therefore, we concluded that the report was not comprehensive, and did not give enough information to team members to allow them to schedule their interdependent activities with others within the programme. Although the project managers specified deadlines when they requested additional information, in 50% of cases deadlines were missed. The situation was much different in case study number two, where the team depended on a regular weekly report distributed to all team members, which covered all the information. Sometimes, the project managers requested additional information from other team members within the programme but that was done through a standard procedure and the team member was given a deadline to respond. In most cases, the information was received by the team member who requested it on time. Programme involved parties in case study number two were very committed to effective communication.

The way communication happened in case study number one indicated that there was no standards implemented in the programme to ensure effective communication among all involved parties. In case study number one, design changes sometimes happened and agreed by the senior management in the organization without informing the programme manager. Overall, communication in case study number one was not effective. However, in case study number two, there was a strong system in the programme, including a manual prepared by the programme manager covering all communication protocols, communication process and

procedure and provides forms and formats for the communication in all levels within the programme or outside the programme with external stakeholders. We found the manual simple and well organized. Therefore, the communication in case study number two was very effective.

Effective delivery of programme as presented in the conceptual model depends on three factors: successful project completion, effective management of risks and efficient coordination between different teams in a programme. In case study number one, there were huge delays, undefined additional costs, and quality problems in the three projects investigated. There was no effective management of risks, and no efficient coordination between different teams in the programme. Senior management decisions in case study number one always delayed to reach to programme manager. There was no proper quality management to ensure teams coordinated interdependent activities. There was no proper master schedule for the entire programme to ensure that planning was done and interdependencies between projects were considered. There were no regular updates for the existing master schedule and it was not distributed to all involved parties on a regular basis. Therefore, under all these circumstances we concluded that programme delivery was not effective.

Performance of the programme in case study number two involved a minor delay of 1-3 months, a huge amount of additional costs, and the projects were delivered in a high standard quality. The risk management applied was not very effective; however, project managers gave some examples where they managed to mitigate risks and reduce risk impacts in their projects. There was very proper and efficient coordination, and a master schedule covered all elements of the programme. The schedule was updated regularly in weekly meetings between programme manager, project managers, internal stakeholders and representatives from external stakeholders. The schedule updates were shared after this meeting with all involved parties to ensure that they fulfilled their commitments and took action on time as per the schedule. Therefore, we concluded that programme delivery in this case study was very effective.

5.2 Conclusion

The hypotheses that there is a positive relationship between effective communications in programme and effective delivery of the programme were confirmed by the data. Therefore, for effective delivery of a programme in the construction industry, organizations need to create environments to make sure that there is effective communication deployed across programme involved parties such as, programme management team, other departments in the organization and external stakeholders.

Moreover, analysis of case studies drew a clear picture of fundamental factors required to create an effective communication in programme. This conclusion was almost aligned with the conclusion determined from the literature review. Case studies data analysis and conceptual model illustrated the positive relationship between, information symmetry, interpersonal communication skills for programme manager and project managers, and team commitment to effective communication effective communication in construction programme. The data analysis also shows that, trust and diversity of knowledge have limited impact on effective communication in construction programme. However, the impact of trust and diversity of knowledge requires more investigation via other case studies; further research in this subject is recommended.

Both the literature review and case studies confirmed the positive relationship between successful completion of projects and efficient coordination between different teams in a programme. Although the conceptual model presents a positive relationship between effective risk management and effective programme delivery, analysis of the case studies did not present effective risk management as a mandatory factor for effective programme delivery. Therefore, the researcher recommends further research via other case studies to investigate the relationship between effective risk management and effective programme delivery in the construction industry.

To create effective communication in a programme, proper implementation and consideration for information symmetry between different teams and the programme management team, programme manager and project managers' interpersonal communication skills, and team commitment to effective communication are required. In addition, programme managers must develop standard processes and procedures for communication between team members on all levels, and to ensure the timely sharing of information, particularly between

interdependent project teams. The programme manager and the project managers have to adopt different communication practices to encourage their teams to enhance communication and maintain proper coordination. Practices such as social activities between team members and event celebrations could add value to effective communication.

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7 Appendices

7.1 Sample of Questionnaire answers

Qualitative Method / interview questionnaire –

programme manager case study number 2

1. Within projects to which extent is timely information shared effectively? Do you find sometimes some projects fallout? What do you do to ensure project teams receive the necessary information?

Answer:

It was shared on time, within less than 24 hours' information shared between team and stakeholders and client and customers and end users, developers, even ideas have been shared directly and meeting will be arranged immediately and information has been shared during that meeting effectively. very rare case or even never happen to have project manager not having the necessary updated information. if that happens will be talked during weekly progress meeting. I always make sure that information has been transferred to the team I do brain mapping which I make matrix to ensure messages received by all relative team members. There was a department manual having all communication channels and communication plan it shows everything. it shows each individual within the team his responsibility and authority and communication channel that he has to follow.

2. What are the different communication practices that you use in your programme? To which extent are these practices effective?

Answer:

The different practice is that the brain mapping which I make matrix to ensure messages received by all relative team members the other thing is that we have a department manual wherein we clarify all team members and stakeholders and the best way and official way

to communicate with each of them. the manual has been distributed immediately to the team. General introduction to the manual made to each individual. the practice was very effective it is clearing the path to all the team in the latest development that is occurring on the programme which will allow faster information and decision to contractors. I was relying on PMs to meet with consultants that is why information was shared immediately with PMs to ensure effective communication and implementation also avoid any abortive works.

3. To which extent do you plan your programme based on information received from other stakeholders in your organization or from stakeholders within the programme?

Answer:

I have to do cross check and analysis the information first to ensure that I received the information from reliable sources that have the authority in the programme and ensure official instruction from decision makers prior to cascade such request to my team. The trust was very high; I have to ensure the official channel of communication. From the decision makers of the entity. example: decision to open the project earlier, so I have to receive the instruction from the decision makers. The team have been appointment after many interviews and probation period more than three months also we used to check the team reliability from their previous references this assist me to build trust between them since majority of them were very professional, we also went through many learning curves in the business and this also improve the trust between the team, I used many social activities among the team to build that trust and create healthy environment between the team members this is absolutely enhance the team communication and therefore, have positive contribution the programme success.

4. To which extent do members of your team have different education backgrounds? To which extent do they have different knowledge? To which extent does the diversity of knowledge in your team impact your team communication effectiveness?

Answer:

There is major different education background for example: there is secondary school, majority are B.Sc. Engineering few have master degree and minorities PhD, there was diversity in knowledge and experience due to different backgrounds and different titles and designations. There was positive impact although the team was from different nationalities. And most of them they worked in international firms where they went through different course in business excellent and high quality management, so they have enough knowledge to deal with different backgrounds and nationality.

5. To which extent do you receive timely information from other stakeholders within the organization? Do you normally specify a deadline to your team or stakeholders when you request a report, information or approvals? Do you receive requested reports, information or approvals by deadlines specified?

Answer:

All my request is usually with deadlines, yes major case I received on the specified deadline. yes, even from stakeholders. Programme team and stakeholders was coordinating the tasks between them in a weekly meeting with the entity VP we were calling that meeting the one thing meeting (TOT meeting), wherein all the updated information has to be shared in very effective manner and action specified accordingly and distributed cross the entire

team and internal stakeholders and for external stakeholders' official letters normally send to them from the entity VP.

6. To which extent are programme team members aware of the latest project design drawings? To which extent are team members in different projects aware of other project schedules?

Answer:

I have very high confidence that the relevant staff are using the latest design drawings because there is a high quality control of issuing the documents whereas revision logs were distributed whenever there is a revision issued from the design consultant. This allows us every time to ensure that updates have been circulated to all team members. There are master schedules covering the entire programme and project progress and time lines have been updated on a weekly basis and distributed to all the team, nevertheless, there is a weekly programme meeting wherein each project manager has to present to other project managers his project progress and forecasted time line schedule.

7. Can you describe how effective risk management is in your programme? What is the current situation of interdependent projects? Are there any delays? Are there any additional costs to be paid to contractors? Did your team review variation orders? What is the percentage of variations in the entire programme? When handing over projects, are there usually snags? How long on average does it take your team to rectify problems?

Answer:

The risk was covered through a risk register and risk plan. It was one of the crucial requirements that each project manager has to create, implement and submit for approval, on a regular basis it was a very effective way of managing the risks and sharing risk items with

other project managers to ensure fulfill his sharing part of the mitigation if there are any shared activities between different projects in the programme there were few delays on the projects due to many factors as follows:

Authority approvals

Market requirements (market researchers have advised to increase certain land use and hence, there was a revision in the master plan)

Budget approvals.

Other stakeholders.

Yes there were additional cost and some variation and the process of initiating the variation from review and verify with the data base till final approval was very detailed in the department manual were as few disciplines and designations review these variations request starting from PM, Qs, Contracts manager, Planning, design , programme manager till the approval of the entity VP and finally the approval of CFO and the chairman of the mother firm the value of the variations in general around 10-15%.

The quality I can say it was a worldwide quality the design has been done by high quality international consultant and the works have been constructed by well reputation contractor firm.

Qualitative Method / interview questionnaire

Project Manager from case study number two

1. How effectively is information needed from other projects communicated? To what extent is information updated across the project team?

Answer:

My project was interdependent with infrastructure project and was receiving regular reports in a weekly basis from the infra PM that was very effective for me to know the updates and act accordingly. This report was distributed a cross the system and every member within the team receiving the same report in the same time so all the team was updated.

2. What are the different communication practices that you adopted in your project? To what extent are these practices effective?

Answer:

I have used normal communication methods such as emails, regular meetings the other method we used in the programme in general is social networking after working hours we also used to celebrate each members' birthday in the office this build relationship and this makes communication during working hours more effective. I found this way is very effective.

3. To which extent did you plan your project or subsequent activities in your project based on information you received from other project managers or stakeholders in your programme?

Answer:

I normally received information from my colleague, the project manager of the infrastructure and accordingly I make my plan with my contractor taken into consideration the information I received for the infrastructure. Even from the stakeholders there was a very good relationship with our internal stakeholders we usually trust each other's and supply the required information.

4. To which extent does your team have different education backgrounds? To which extent do they have different knowledge? To which extent does the diversity of knowledge on your team impact your team communication effectiveness?

Answer:

They are different education background and they have different knowledge and experience. Yes, the diversity of the knowledge makes them accommodate each other's and this is simplifying the communication and make it more effective.

5. To which extent do you receive timely information from other project managers whose projects are interdependent with your project? Do you normally specify a deadline to your team or stakeholders when you request a report or information from them? Do you receive reports or information requested by the deadlines specified?

Answer:

Yes, I received weekly report wherein all the information I need I found it there and updated. The report received on time usually there is delay sometimes. However, in general it is acceptable because when I request the information I make contingency in the deadlines

because I know how busy other team are. I would say that 8 out of 10 I always received information on time.

6. To which extent do you think your team members are aware of the latest design drawings? To which extent are team members aware of design changes?

Answer:

Not all of them I would say 80%, but the most critical team I mean the site supervisor and other construction managers are always updated and aware because they are going to construct these shop drawings. however, sometimes office support team sometimes not updated and they came to know later. Design changes is the same scenario.

7. Can you describe how effective risk management is in your programme? What is the current situation of the project? Are there any delays or additional costs to be paid to contractors? Did the consultant send you a log of noncompliance reports? How many noncompliance reports completed so far? Did your team review variation orders? What is the percentage of variations in your project?

Answer:

However, there is no strong risk management applied but we managed some critical risks effectively by close coordination with ourselves as a team. For example, the information provided by the infrastructure team that the power connection might be delayed and immediately as a team identify this as a risk and make a contingency plan by providing generator in order not delay the testing and commissioning and to handover the property to the customers and it avoided huge delay and mitigated the risks that might happen due to that which is the customer right to claim damages and the cost will be much more than providing generators.

There was no delay the project has been handed over on time. There was additional cost due to some missing scope during design. There was no big number of NCRs quality was very good.