Isaac Timilehin Olufuwa

IMPROVING INTER-UNIT COLLABORATION DURING THE PROJECT SALES PHASE

A Case Study

ABSTRACT

This thesis, conducted as a case study is aimed at studying the collaboration between three functional units of a supplier based-project management firm. In particular, the main purpose of the case study is to study how the sales unit, sourcing unit and the project unit of the firm share information, especially during the sales phase. Therefore, this study explores what collaboration between the sales, project and sourcing units means. Furthermore, this research also explores what are the information generated and shared during the sales phase, and what benefits is or are achieved when the units collaborate.

This thesis highlights the importance of information to units during the project management phase. Furthermore, this thesis shows how important it is to handle information appropriately and ensure information quality. Through literature analysis, the author introduces existing theoretical concept, and collects data through questionnaires and interviews for analysis. An assessment of the existing practice functions and processes of the units was also done. After which the content analysis methodology was used to analyze the data collected.

It was found that in the supplier based-project case company, a lot of information generated during the sales phases of every project is critical and useful during the sales phase and after the completion of the sales phase. Also, gathering information is an important part of the project during the sales phase because it helps to understand the project requirements and propose a competitive offer to the customer. In addition, the information enables other units to make proper plans to support an effective project execution. Therefore, another important finding was the need to share the information early enough with other stakeholders, and through the right medium that supports the easy access of the information. Based on the case company under study, it was found that the sales, project, and sourcing units of the firm all benefit when they share information with one another.

This study tackled an important area of supplier based-project firm, however, the data gathered and analyzed was only from one case company. Hence, this study can be used as a starting-point or guide for similar research in other case companies. Furthermore, the findings of this study may be used by academic institutions, professionals in the field of project management, and organizations.

Keywords: collaboration, information sharing, supplier based-project firm, sale information, project information

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

PREFACE

This thesis case study was initiated by the case company as a part of their ongoing effort to continuously improve their processes, also, to support the completion of my studies I sincerely appreciate the effort of my supervisor (at the case company) for his support throughout this process. Also, considering the difficult period when this thesis was initiated – during the covid outbreak which led to uncertainty around the world and to businesses – I am really grateful to the case company for following through with the study. Also, I am thankful for the support I received from the employees who participated in this case study, and I hope that the findings herein contribute significantly to their daily efforts.

As an employee of the case company, this thesis exposed me to learn more about the operations of other units of the firm. I am convinced that with the knowledge that I have gained during this painstaking process, I can continuously grow to achieve my career objectives. Also, I am glad to have been able to explore my interest in the field of project management through this thesis. However, I received guidance and support from my thesis supervisor. Therefore, I would like to declare my special gratitude to Professor Tuomas Ahola for his patience, advice, support, guidance and mentoring throughout the case study.

I would also like to thank my course mates for the collective support and encouragement to achieve our degree program's goals. The journey we shared as a group will always be a part of me. I am also grateful to Lecturer Jouni Lyly-Yrjänäinen for his support and mentorship and to Education specialist Minna Baggström for her advice throughout the degree program.

Finally, a heartwarming gratitude to my wonderful family, my lovely wife, daughter and son. They never stopped showing love and believe in me even during the overwhelming periods, and I constantly received the support and motivation I needed to complete my thesis and my master's degree program.

Tampere, 02 December 2022

Isaac Timilehin Olufuwa

CONTENTS

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1. INTRODUCTION

1.1 Motivation for the study

The activities in project-based firms are centered around projects (Gann and Salter, 2000) and these firms offer complex products/systems and sometimes expert services to present solutions to their customers (Hobday, 2000). Also, the organizational structure of project-based firms is designed to facilitate the coordination of projects and it is expected that there is a higher level of collaboration between discipline and departments in project-based firms than in non-project-based firms (Driessen and Ende, 2010). In other words, in non-project-based organizations daily collaboration between departments is limited, however, in project-based firms the departments are created to facilitate daily coordination of projects (Driessen and Ende, 2010).

Projects can be viewed from different perspectives. Artto et al., (2011) explain that projects can be seen from a supplier's perspective or from a customer's perspective. Basically, the activities performed during the project marketing and sales phase from the supplier's perspective differs from that of the customer's perspective, but the aim of a sales contract remains the same (Artto et al., 2011). From a supplier perspective, the main activities during the project marketing and sales phase are arranged in the following order: competitive bidding preparation, contract bidding, and sales contract negotiation and preparation. While from the customer perspective the main activities during the project marketing and sales phase are the following (in order): project procurement preparation and planning, analyzing and comparing bids from different project suppliers, and sales contract negotiation and preparation. Most project management literatures traditionally focus on project topic from a customer perspective (Artto et al., 2011), however, this case study focuses on the case subject from the project supplier's perspective. An example of a study from a supplier's perspective, is the research study by Ryynänen et al. (2013) which addresses the issues of communication and barriers to and drivers of efficient internal communication during the project sales phase in a supplier project-based firm. Their research shows the importance of efficient internal communication in a supplier's project-based firm.

Research by Turkulainen, V. et al., (2013) suggest that the integration and collaboration between different functions within a project-based firm is imperative to project success. While the study by Skaates et al. (2002) discusses the importance of network and relationship management as pivotal to the success of project marketing. Basically, in recent years, some researches have focused on internal relationship and communication between functions within a project-based firm, while some others have focused on the external relationships the project-based firms have with customers.

In the case study by Ryynänen et al. (2013), the case company was a supplier project-based manufacturing firm which offers tangible product solutions to solve customers' problems. The proactive integration and coordination of the raw materials, designs, processes, and selection of the material suppliers (Trent and Monczka, 2003) required for manufacturing, also known as sourcing, also plays an important role in project delivery success. In addition, the sales function plays an important role in value creation, and its role is critical to the growth of any organization (Haas et al., 2012). In project-based firms, the project sales unit is the bridge between the firm and the customer (Turkulainen, V. et al., 2013), and it helps to create and maintain relationships with customers (Cova et al., 2002). In other words, the project sales unit is responsible for selling the firm's solutions to customers while also developing and maintaining relationship with the customers. For the project sales units to perform its function, the unit internally cooperates, communicates and exchange information with other units, for example, the project unit (Turkulainen, V. et al., 2013; Ryynänen et al., 2013). The project unit is responsible for the delivery of the project to the customer as agreed and as specified in the contract agreement (Turkulainen, V. et al., 2013).

As information is one of the key words in this paper, therefore, a quick clarification of what type of information this paper focuses on. According to Elearn (2009), there are different forms of information. These forms of information include qualitative information, quantitative information, firm internal information and external information (Elearn, 2009). As there are different types of firm internal information, during this study, emphasis is on information acquired during the sales phase (or sales information) and other project related information. Although existing literatures comprises of different studies concerning project-based firm's functions and activities. There is still the need to explore information sharing between different units during the sales phase and before project delivery. Also, in addition to cost control, the efficient management of time and available resources is important for project firms, and firms also aim to serve their customers well and gain competitive advantage through coordinated effort of the resources (and information) between departments, divisions, and units (Porter, 1985). Therefore, to improve work processes that will translate to gaining competitive advantage, efficient cost control, and better management of available resources, the motivation of this research is to study and understand the relationship (as regards information sharing) between the sourcing unit, sales unit and project unit during the project sales phase. What the relationships between these units contributes during the sales phase and possibly explore in what way does it impact project delivery.

1.2 Research questions and objective

As mentioned earlier, although existing literatures comprises of different studies concerning project-based firm's functions and activities. There is still the need to study the collaboration between different functional units, especially from a supplier project-based firm perspective. According to Cuijpers, M. et al. (2011) inter-departmental collaboration is defined as the exchange of information between departments. Also, according to Oxford Dictionary of English (2010), information exchange is central to collaboration.

Whereas information exchange is defined as the act of giving and receiving information (Oxford Dictionary of English, 2010). Therefore, in this case study, we define collaboration mainly as the exchange or sharing of information.

The exploration of this topic will contribute to answering certain important questions. For example, it is important to ask if the collaboration between the units during the sales phase in a supplier based-project firm is critical to the firm's project delivery success? Or it may open the channels to unexplored research areas. Ultimately, this study may lead to findings that will contribute to the knowledge of project management in project-based firms and may be beneficial and referenced in other future studies. Also, this research project analyses the sales phase during a project lifecycle in a supplier project-based firm. Particularly, it focuses on the activities of some three functional units, which are, the sales unit, the project unit and the sourcing unit. The firm has two business areas, the marine unit and the land unit. This research mainly focuses on functional units within the marine business unit.

The project-based firm, which is based in Vantaa, Finland, is a company which provides high pressure water mist fire protection systems to its customers globally. The case firm is a good example of a supplier project-based firm, hence, allowing the case study to be viewed from a supplier perspective rather from a customer perspective. From a project supplier perspective, the specific sales activities which take place during the sales phase are divided into three: competitive bid preparation, bid submission, negotiation and contract preparation (Artto et al., 2011). First, during the competitive bid preparation stage, the project firm prepares an offer tailored to provide value-added solutions regarding the customer's needs while simultaneously providing profit to the project firm. Second, at the bid submission stage, the prepared bid which includes technical and financial offer of project firm will be submitted to the customer for evaluation. Finally, at the negotiation and contract preparation stage, the project technical details and financial details, and project work related issues (if offered) are scrutinized by the customer and project firm to arrive at a deal agreeable to both parties after which a sales contract can be signed.

According to Artto et al., (2011) many important decisions concerning the project delivery are made even before the project is executed. Therefore, it is imperative that the project sales unit have the accurate information related to their solution offering to their customer to achieve successful project delivery. This leads to the objective of this thesis…

… Enhancing collaboration between the sales unit and the project and sourcing functional units during the sales phase in a supplier based-project firm..

The above objective further raises three important research questions to help thoroughly scrutinize this study. The research questions are:

1. How the sales, project and sourcing units exchange or share information during the sales phase?

2. What information is generated during the sales phase of the project?
3. What does collaboration during the sales phase contribute to the units?
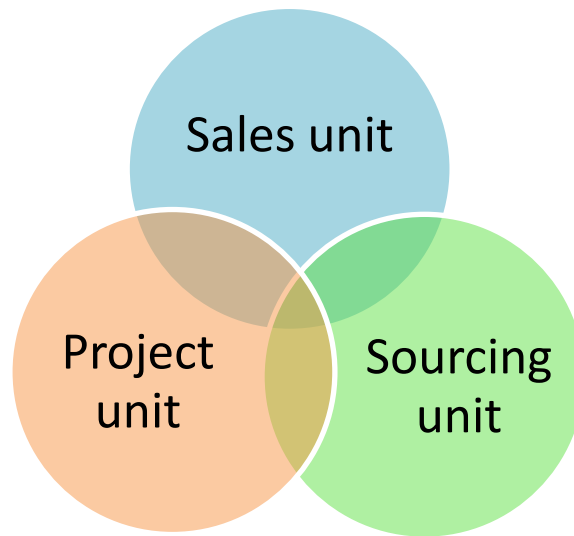
Figure 1. Collaboration between units of a supplier project-based firm.

The research questions in relation to the sales unit and the other units are illustrated in Figure 1. During the sales phase, the sales unit engage in competitive bidding to secure a sales contract. However, preparing a competitive bid requires cooperation with other units, especially those units responsible for the operational activities of the project.

Clearly, the research questions identify a gap that can make both academic and industrial contributions. In terms of the academic contributions, the research explores project sales phase and adds to the academic knowledge and understanding in the project management field. In industrial terms, the research gives an insight into the project sales phase activities in a project-based firm regarding how communication between units at the project sales phase can impact project delivery.

1.3 Empirical strategy and data collection methods

Efficient data collection for analysis is principal to achieving answers to the research questions, and to achieve the objective of this research. Since the data collected will serve as the spine of this research, therefore, it is imperative that effort is put into collecting the right data accurately. Furthermore, applying the right research method is equally very important. According to the perspective of Järvelin & Vakkari (1990), research method includes chosen research strategy (e.g., empirical, conceptual), data collection method (e.g., observation, questionnaire), and analytical approach (e.g., quantitative, qualitative).

Empirical research strategy will be adopted during the course of this research. According to Patten, M. L. & Galvan, M. C. (2020), empirical involves the gathering or acquisition of knowledge via observations. While Roth (2007) defined the term empirical as the systematic process of acquiring and analyzing via either direct or indirect sources or observation. However, the preference of what type of research method to adopt is largely based on the researcher's bias regarding what type of knowledge is to be acquired and the best ways to acquire it, according to Viorela (2019). Also, Chu & Ke (2017) and Viorela (2019) further explains that data can be gathered systematically through interviews, observations, surveys, questionnaires, etc. and these data are analyzed using either quantitative or qualitative analysis method or both.

Soni & Kodali (2011) state that empirical research is field-based research which uses data acquired during actual events, rather than simulated data, for research purpose. In other words, empirical research strategy encourages the researcher adopt a hands-on approach during knowledge acquisition. A hands-on approach in data collection will allow the possibility to acquire real-time and raw data, but most importantly, the researcher will be more engaged during the research.

Although there are empirical research approaches, however, the researcher will adopt the case study research approach during this research. A case study research strategy is a present-time phenomenon in its real-life context, especially when the boundaries between phenomenon and context are not clear (Yin, 1981). According to Phelan (2011), the case study research approach allows the thorough review and analysis of new or unclear phenomenon. In other words, the case study research strategy allows the researcher review and analyze different cases as done in this research. For analysis purposes, the researcher will review and analyze a project sales case. Reviewing a sales case will provide status quo data to help understand the current situation better, thereby, providing a better perspective to the research outcome and conclusions.

According to Eisenhardt (1989), data analysis is an integral part of a case study, and it is a difficult process. Therefore, it is imperative for the researcher to adopt the right data collection approach because this determines what type of knowledge is extracted from the data and the analytical approach that will be adopted by the researcher, according to Paradis, E. et al. (2016). Data collected during this research are qualitative data, and the method of data collection is via interviews, questionnaires, and archival records. Stakeholders from the sales, project and sourcing unit play an important part of providing data. After the collection of data for analysis, the researcher chose to analyze using the qualitative content analysis approach as described by Mayring (2000); Moretti, F. et al., 2011; Given, L. M. (2008) and as adopted in the studies by Corley & Gioia (2004); Ryynänen et al. (2013). This approach allows for rigorous analysis of data, as in this case when the knowledge about the phenomenon is not enough or is fragmented (Elo & Kyngäs, 2008).

2. LITERATURE REVIEW

2.1 Literature review introduction

This section creates the platform on which this research is built on. In metaphorical term, this is the skeleton of this study. As such, it is necessary to cover the right topics in this section. In addition, the researcher also recognized that to achieve cohesion and support analysis during this research, considering several data sources and literature is important. More so, a well-grounded literature background is a prerequisite to developing a framework to support during the analysis phase, to define the findings of the research and when proposing answer to the research questions. According to Bansal and Corley (2011), in addition to providing a bold description and understanding of the phenomenon under study, literature contribution also provides support to the researcher to know how to frame dialogue around the subject and how to analyze the phenomenon. Therefore, the researcher has selected literature which directly provide insight to the research topic and the questions asked.

Since this study is centered around three different units of a project firm. Acquiring theoretical knowledge of the operations and functions of the units in critical to understanding the case and will further assist in analysis. Therefore, Section 2.1 provides a wholistic understand and description of the sales unit in project-based firm. Several literatures were used in this section, however, to share significant insight to the supplier based-project firm, the literature by Artto et al. (2011) stands out as a significant contributor. In this section, we delve into understanding how the project sales phase works, and we also describe the role and function of the sales unit in a project firm. Like section 2.1, section 2.2 focuses on the next phase of the project lifecycle. We mainly discuss what role the project operations unit is, the responsibilities of the unit and how the project sales unit cooperates with the project operations unit. Next, in section 2.2 is where we discuss about the third unit, the sourcing unit. We discuss what sourcing is from the lens of a supplier project-based firm. In addition to discussing the important role of sourcing in a manufacturing environment through different data sources, we will also try to create an understanding of the activities of the sourcing unit.

As we have earlier defined what collaboration means and identified that information sharing is a central function when collaborating. In section 2.4, we discuss about collaboration while mainly focusing on information sharing. This section discusses what information sharing is and why sharing information is important for project success. Furthermore, we discuss the reasons for sharing information and how this information is shared. Finally, a quick focus on information quality. We discuss what information quality is, and

why the quality of information being shared is as important as the act of sharing the information itself. Next, is section 2.5, where more about the project sales phase is discussed, however, now the focal point is the information generated during the sales phase. Principally, since this thesis is about information sharing between units during the sales phase, therefore, there is the need to understand and know what information is generated during the sales phase of a project in a project-based firm. We discuss what information is acquired during the sales phase (mostly by the sales unit) and the importance of the information to the other units. We close this chapter with section 2.6 by piecing together the different concepts from section 2.1 through 2.5, to develop a unique framework fitting for the phenomenon in this case study. This framework presents a tool that will be useful in the next chapters of the case to help understand the phenomenon better and anticipate the direction of analysis.

2.2 Project sales unit

Two important functional units which perform critical tasks and are present in most project-based firms are project sales unit and the project operations units (Turkulainen, V. et al., 2013). Although these units may collaborate during the lifecycle of a project, yet they have separate functions and responsibilities during projects. Project sales is a part of project marketing, and its activities are targeted at acquiring a favourable and profitable deal with a customer, that is according to Artto et al. (2011). The unit responsible for the sales activities, known as the sales unit, is responsible for creating and maintaining customer relationships, and therefore, act as the bridge between the project-based firm and its customers (Turkulainen, V. et al., 2013; Cova et al., 2002).

The role of project sales unit is pivotal for the project-based firm, as the unit plays an important role in the value-creating process of the firm (Haas et al., 2012). For successful project delivery, the activities performed by the sales unit are very crucial (Momeni & Martinsuo, 2019). In addition to creating and maintaining relationships with the customers, the crucial activities performed by the project sales unit are: receiving the request for quotation, formulating a quotation based on the request, negotiating with the customer, and developing contract terms and agreement with the customer (Turkulainen, V. et al., 2013). A similar perspective according to Artto et al. (2011) is illustrated in Figure 2 below. The Figure shows the project marketing and sales in a delivery project lifecycle from a supplier's perspective.
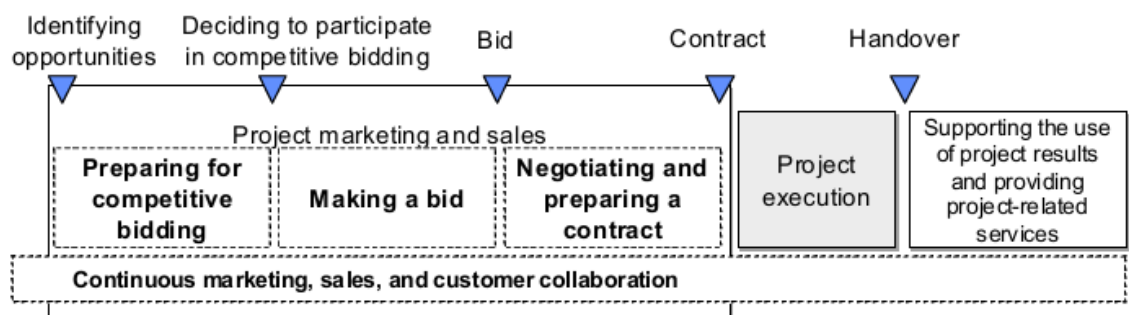
Figure 2. Project sales in the delivery project lifecycle from a supplier's perspective (Artto et al., 2011).

Illustrated in the Figure 2 above are the phases of a project lifecycle with emphasis on the main activities performed by the sales unit in the sales phase. These activities are: preparing for competitive bidding, making a bid and negotiating and preparing a contract.

Preparing for competitive bidding

Basically, this stage of the sales phase happens when the project-based firm is invited to bid for a potential project opportunity by a customer Artto et al. (2011). However, from a supplier based-project firm perspective, the preparation for competitive bidding activity is a very crucial step performed by the sales unit. This is because on identifying an opportunity the sales unit must evaluate the opportunity to ascertain how attractive the opportunity is from various perspective to bring value to the project firm (Wang, J. et al, 2008). Questions related to the potential opportunity's financial profitability for the firm, the firm's available technological options, the strategic importance of the opportunity and project-related risk associated with the opportunity are asked. The consideration of these questions will help the sales unit decide either to make a bid or not to make a bid. For example, if for a certain project opportunity, there is no financial profitability for the project firm, no potential gain in strategic importance and the project has a high project-related risk. Hence, there is no potential value which the project firm might achieve if it engages in such project opportunity.

Making a bid

After the sales unit have identified the project opportunity as a value adding opportunity for the project firm, the next step is to submit a competitive bid for the project to the customer (Anne Skaates, Maria et al., 2002). The bid making step in many cases requires inputs and consultations from other units or other departments of the firm. When preparing the bid, technical and resource inputs and consultations may be required which may lead to discussions with individuals from other units (Ryynänen et al., 2013). However, the project sales case appointed sales manager leads and ensures that the bid document contains the relevant and accurate details (Artto et al., 2011).

As internal communication is sometimes required when making the bid, likewise, it is imperative for the project supplier to retain constant communication with the customer. According to Artto et al. (2011), there are several reasons why the supplier should stay in communication with the customer, and there are some benefits which can be realised in communicating with the customer. For example, the supplier can get clarification concerning open questions, the supplier can acquire better insights and clarity regarding the customer needs, and communication with the customer shows the supplier's interest in the project (Artto et al., 2011). When the bid document is completed, it is then reviewed by the sales manager to ensure its content is accurate, after which it can be sent to the customer.

Negotiating and preparing a contract

After the customer has received the bid, the customer will review the bid, and in many cases the customer will have comments regarding the bid's contents (Anne Skaates, Maria et al., 2002). The customer's may ask questions regarding costs, resources, project documentation, technical comments, and sometimes the customer may want changes to be made (Kujala, J. et al., 2007). Therefore, the bid may have to be reviewed several times until a cordial decision between the supplier and customer regarding the scope of the bid is reached. According to Kujala, J. et al. (2007), regarding the price of the project during negotiation, the supplier and customer have different objectives. While the supplier aims for a higher revenue, the customer aims for a lower price. Also, the supplier may be at an advantageous position during negotiation regarding technical solutions and cost efficiency, nonetheless, it is imperative that the supplier listens to the customer's inputs and try to understand their needs and business (Artto et al., 2011). After an agreement between the negotiating parties have been reached, a contract can be formulated and signed. The contract binds the supplier and customer to their project-related responsibilities and roles. The contract is prepared to be as clear as possible to ensure there are no misunderstandings leading to violation of the contract. The respective parties will only sign the contract when contract terms are clear (Artto et al., 2011).

The project sales unit create value and generate revenue for the project-based firm by selling the firm's solutions to customers, creating, and maintaining customer relationships. The role played by the sales unit is very critical to the survival and growth of firms. Due to the uniqueness and complexity of projects (Turkulainen, V. et al., 2013), there are very few similar project cases, therefore, different customers have different needs. Hence, it is imperative that the sales unit must seek not only to sell the project firm's solutions but also aim to understand the customer's real needs.

2.3 Project operations unit

After the project sales unit have completed the sale of a project, the project can now move to the next stage of its lifecycle. In most firms, the project operations unit of the project firm is mainly responsible for project execution. Although, in some other firms, the project unit may also be responsible for manufacturing and material sourcing. While in some other firms the manufacturing and material sourcing activities is done by another unit. According to Turkulainen, V. et al. (2013), the project operations unit's main responsibility is to lead the delivery of the project as defined in the contract and as agreed with the customer. The tasks performed by the project operations unit include detailed project planning, procurement of materials, project execution, commissioning, and eventually project handover to the customer after completion (Turkulainen, V. et al., 2013; Artto et al., 2011). Basically, the project operations unit is responsible for the project execution phase during the project's lifecycle.
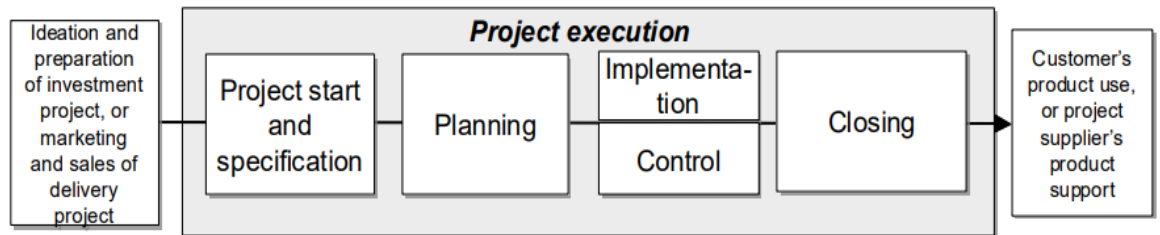
Figure 3. Project execution phase of project lifecycle (Artto et al., 2011).

To lead the operations of the project execution phase, project managers are appointed to lead projects, and therefore, take the responsibility for the project delivery of their designated projects. Figure 3 above illustrates the project execution phase into the following sub phases; project start and specification phase, project planning phase, implementation phase and control phase, and closing.

Firstly, the project start and specification phase signifies the start of the project execution phase, and so, it is imperative that tasks are executed properly. According to Relyea Craig et al. (2014), projects operations will be smooth and have high success rates when the project start and specification phase is executed properly. In the project start and specification phase, project execution related risks and their potential effects on the success of the project are identified. Also, the project related needs, changes that may be caused by the project and the project goals and objectives are specified and outlined. In the end of project start and specification phase, a preliminary project plan is derived (Artto et al., 2011). Secondly, the project planning phase involves assessing the project implementation activities and the required resources needed to execute the activities, thereby, creating a detailed project schedule and a resource and cost structure for the project (Artto et al., 2011). During the planning phase, the project scope will be described in detail (Campbell, G. M., 2014). Also, the unit thinks ahead on how to achieve project goals, create measurement standards to measure project progress to achieve the goals, and how to communicate the standards to the stakeholders Anon (2002). Through proper project planning, uncertainty can be reduced or eliminated, a better understanding of the project objectives can be achieved, project operation efficiency will be improved, and monitoring and control of the project can be achieved Anon (2002). Thirdly, the implementation phase of project execution. Implementation can be briefly described as putting into action what has been planned. According to Artto et al. (2011), in the implementation phase, the aim is to achieve the project objectives and produce relevant project deliverables and documents, therefore, the right resources should be directed to the activities or tasks at the right time. According to (Campbell, G. M., 2014), the implementation phase is where the actual works starts to happen. Fourthly, is the control phase, which according to Artto et al. (2011), is a separate phase from the implementation phase but happens in parallel with the implementation phase. According to Vanhoucke, M. (2012), the project control phase involves the measurement of time and cost performances during the project to ensure that it aligns with the project time and cost targets, and where necessary take corrective actions to ensure project success. As project reports are created during the implementation phase, the progress of the project is also monitored

through reports and by comparing project technical specification with the actual implementation (Artto et al., 2011). Finally, the closing phase is the much-awaited phase of the project (Zohrehvandi, S. et al., 2020), however, it is a critical phase that gets little attention in terms of research (Artto et al., 2011; Wen and Qiang, 2019). Typically, during the closing phase of the project, the different stakeholders ensure that all commitments have been fulfilled and no commitment is ignored, and in addition, project documents are finalized and archived (Zohrehvandi, S. et al., 2020; Artto et al., 2011).

According to Kerzner Harold (2013), although the project execution phase involves good working relationship amongst the project stakeholders to develop the project plan. Nonetheless, if the project is poorly executed, having the best plan will be irrelevant, therefore, resulting in the loss of time, cost and quality of the project (Frigenti and Comninos, 2002). As already mentioned earlier, the main objective of the project operations unit is project execution. To achieve the project objective during the project execution phase, the essential functions of the phase must be followed. These functions are monitoring, evaluation and controlling (Frigenti and Comninos, 2002). Monitoring simply refers to the collection, reporting and recording of the project related information. Evaluation refers to determining the quality and the effectiveness of the project performance. While controlling simply means applying the acquired information to ensure that actual performance matches the planned project performance.

Furthermore, the project operations unit follow defined steps during the project execution phase to achieve the project objective, and these steps may be slightly implemented differently by different project-based firm as seen in the case study by Turkulainen, V. et al. (2013). According to Frigenti and Comninos (2002), the steps primarily include the following: project kick-off, creating and implementing the monitoring and control tools, project performance and progress monitoring and evaluation, generating progress status and performance reports, feedback control and problem solving, revising the integrated project plan baseline if required. By following these steps during the project execution phase, the project deliverables as defined in the project scope will begin to materialize (Brewer and Dittman, 2018). Hence, it is imperative that the process to acquiring resources, develop teams and manage teams (Brewer and Dittman, 2018) during this phase is properly done.

2.4 Sourcing unit

While purchasing and procurement as a process or function in project management is an area that has been of focus in some literatures, however, literatures on sourcing is an interesting topic because there exists limited literature on sourcing from the project management perspective. Although the three concepts, that is, purchasing, procurement and sourcing, are sometimes interchanged, it is worthwhile to clarify that the three concepts are not the same. In the study by Murray, J. G. (2009), the author identified how purchasing and procurement are used interchangeably leading to the misunderstanding of the terms. And according to Trent and Monczka (2003), practitioners and researchers interchange the terms global sourcing and international purchasing, even though there

exists fundamental difference between these terms. While purchasing refers to the actual process steps of ordering and receiving goods and services, procurement on the other hand encompasses the activities and process involved to acquire goods and services (Murray, J. G., 2009; Bhargove, 2018). In other words, purchasing activity is a part of procurement or can be said to be a subset of procurement (Bhargove, 2018). As procurement management is identified as a knowledge area in project management (Brewer and Dittman, 2018; Artto et al., 2011), therefore, some project management literatures focus on procurement issues as a part of project lifecycle (Artto et al., 2011). The knowledge areas of project management according to Brewer and Dittman (2018), are the body of knowledge which a project manager must possess to be able to consistently deliver successful projects in accordance with the project objectives and meet customer expectations.

Sourcing can be said as the proactive integration and coordination of common or regular items and materials, processes, designs, technologies, and suppliers across worldwide purchasing, engineering and operating locations (Monczka and Trent, 1991). Or probably, another definition by Narasimhan and Das (1999), sourcing is process of designing and managing supply networks relative to operational and business performance objectives. In addition, sourcing was born out of the necessity to align buying cycles with production requirements, and the need for firms to optimize purchasing and supply management activities while eliminating all nonvalue-adding activities (Kocabasoglu and Suresh, 2006). In sum, an organization's sourcing unit enables the organization take proactive initiative in selecting, organizing and maintaining its suppliers and supply channels in an effort to meet production requirements while eliminating nonvalue-adding activities within the supply chain.

The sourcing unit of a supplier based-project firm which manufactures its products parts and produces its equipment will play a significant role in achieving project objectives. For these manufacturing project-based firms, achieving manufacturing flexibility or the ability to cope with external or supply uncertainties (Narasimhan and Das 1999) to ensure on-time project delivery will be critical. Furthermore, to enable the project-based firm to meet the project manufacturing objectives, the sourcing unit must collaborate internally with other units to acquire up-to-date data collection, and externally with its suppliers to enable the establishment of supplier selection and long-term buyer-supplier relationships (Chiang, C.-Y. et al., 2012). The empirical investigation by Kocabasoglu and Suresh (2006) findings indicate that the vital role the sourcing unit plays within the firm is equally important as the management of relationship with the firm's suppliers. In addition, sourcing activities affects several functions within the firm, thereby, requiring stronger integration among the firm's functions and an increase in cross-functional communication (Kraljic, 1983). Therefore, in a supplier based-project firm internal communication and collaboration between the sourcing unit and other functions (Kocabasoglu and Suresh, 2006) is critically equal to the manufacturing of the firm's products as it is to meeting project objectives.

According to Sollish and Semanik (2010), traditionally sourcing is the locating and employing of suppliers either locally or globally, and as argued by some literatures,

sourcing aims to generate cost advantage by driving down unit price of sourced items (Scheffler, 2015; Lin, 2020). Also, study shows that a firm's sourcing success is reliant on its internal cross-functional integration (Scheffler, 2015) and its operational sourcing activities (Sollish and Semanik, 2010). A firm's cross-functional integration refers to co-operation between the firm's various functional units to aid in supplier selection and management. The study by Pagano (2009) emphasizes the importance of control and process management for implementing sourcing activities. One of the main objectives of sourcing is to ensure the availability of materials for manufacturing on-time by selecting and securing contracts with material suppliers (Sollish and Semanik, 2010). The process of selecting the right supplier is crucial and critical to the supply chain (Chan, F. T. S. et al., 2008), and according to Su and Chen (2018), various techniques and approaches have been suggested through empirical research and studies. Basically, the process of selecting a supplier includes requirements, prequalification, solicitation, supplier selection and contract formation with the supplier (Sollish and Semanik, 2010). However, according to the literature available on the sourcing process, the sourcing process is described with a varying number of steps. For example, while some literatures describe the sourcing process as seven or eight step process, Payne and Dorn (2012) describe the sourcing process as a six steps process. The six steps in progressive order are: data collection and spending analysis, research, the RFx process (requesting information, quotes, and proposals from suppliers), negotiations, contracting and implementation and continuous improvement.

First, data collection and spending analysis involves collecting spending data, since sourcing help firms migrate from the management of indirect spending resulting from single purchases to an organized and coordinated effort involving supply planning, supplier selection and contracting to establish a steady flow of material supply for the firm (Payne and Dorn, 2012; Schiele, H., 2018). According to Payne and Dorn (2012), one of the main purposes of data collection is to determine effort focus areas to reduce material purchase costs, and this is achieved by analyzing the data collected. Second, during research, the firm determine what are the alternative products that exists in the market (Payne and Dorn, 2012), and information regarding the potential suppliers in the market is gathered (Cavinato, J. L., 2006). The aim of the research step is to establish the existing competition in the marketplace by refining the firm's sourcing strategy (Payne and Dorn, 2012). The RFx process (requesting information, quotes, and proposals from suppliers) step involves requesting for information and proposal or quotation from suppliers, and then, evaluating the responses from the suppliers in order to determine the possible quantitative (cost savings) and qualitative (value-added) benefits via an objective process of score-carding or grading system (Payne and Dorn, 2012; Cavinato, J. L., 2006). Fourth step is negotiation, which takes place after the proposals or quotations have been received, refined and analyzed by the sourcing firm. There is usually a large pool of listed suppliers at the beginning of the negotiation, however, the pool is eventually narrowed to a few finalists (Cavinato, J. L., 2006). Also, the sourcing firm will develop target prices for materials or services to be purchased and negotiate with the suppliers to meet the sourcing firm's target purchase price (Payne and Dorn, 2012). The fifth step, contracting, is about converting terms agreed with the selected suppliers into legal documents (to define the rules of engagement between the firm and the supplier) that will be signed by

the respective parties (Payne and Dorn, 2012). In addition, during contracting, pricing agreements can also be reached for purchases (Payne and Dorn, 2012). This leads to the final step of the sourcing process, implementation and continuous improvement. According to Schiele, H. (2018), sourcing is the process of planning supplies, selecting suppliers and establish contracts with the suppliers which enables the customer firm to establish strategic and long-term relationship with suppliers and save costs. Hence, this step ensures that the work done during the sourcing process steps are upheld and followed through, that is, the savings gained needs to be tracked at all times, invoices reviewed, and developing and reviewing internal measures to ensure that the contracts are being adhered to (Payne and Dorn, 2012; Schiele, H., 2018).

It is important to have a detailed description of the material needed to be sourced and what it is needed for (Sollish and Semanik, 2010). This is imperative for the identification of the right suppliers for the material (Su and Chen, 2018). After several suppliers have been identified, the suppliers are assessed through a prequalification stage to ensure that the supplier can meet required financial conditions and supply materials at competitive prices (Sollish and Semanik, 2010). After this is solicitation, which in simple terms refers to the various discussions with the suppliers, negotiations, and response evaluation. After solicitation, the supplier or suppliers are selected and finally a contractual agreement is formulated with the selected supplier (Sollish and Semanik, 2010). As organizations are becoming more dependent on their suppliers, the direct and indirect consequences of poor supplier selection decision-making will increasingly become more critical (Chan, F. T. S. et al., 2008).

2.5 Collaboration – information sharing

In project-based firms, cooperation between the different departments of the firm is essential to realizing the firm's goals and objectives. In some organizations, daily collaboration is easier done than in other organizations. In the study by Driessen and Ende (2010), the researchers explain that daily collaboration between different departments is more limited in non-project-based organizations than it is in project-based organizations since project-based firms' departments are set-up to enhance daily collaboration. This is because due to the nature of projects, there is the need for constant dialogue and information sharing between different departments during an entire project lifecycle. More so, the case study by Ryynänen et al. (2013) is a good example of how collaboration between different units is essential to achieving set targets, even though the units are miles apart.

For the purpose of clarification, in this study, collaboration has been defined as the exchange or sharing of information. In the Oxford Dictionary of English (2010), collaboration is defined as the action of working with someone to produce something. In addition, the Dictionary also identifies that information exchange is central to collaboration. Whereas information exchange is defined as the act of giving and receiving information. Obviously, the description for collaboration adopted in this study and according to the Oxford dictionary are quite kindred. However, in regard to this study, a valid question is,

what does collaboration mean in a project environment. Or in other words, what is collaboration from the project perspective?

For any project to be successful, collaboration between various individuals or teams responsible for the project is critical, according to Vaaland (2004). When teams collaborate, they exchange information in order to facilitate the achievement of their specific project objectives. According to Landau (2016) project collaboration efforts cuts corporate, national and departmental boundaries, and it enables the project teams and team leaders to plan, coordinate, control and monitor even the most complex projects. It is important that project leaders and managers create the right platform to enable and facilitate the exchange of critical information within the project teams during the entire project lifecycle. Therefore, having the right tools for effective and timely information exchange across boundaries within the project team is very crucial.

The cruciality of information sharing raises some valid questions about information sharing. A valid question is how quality can be defined in terms of information sharing. It will equally be valid to point out what are some of information sharing barriers, drivers and benefits. First, a quick description of information. In simple terms, information can be described as applied data that is value-adding (Elearn, 2009). While according to Diamant (2017), information is/are the structures found in a given set of data. In other words, information is derived from data which has been gathered, sorted, and analyzed. We continuously generate data every day and every time. For example, hitting certain keys on the computer keyboard to type texts is simply the same as creating data. These data, if inputted in the right order will make words and sentences, hence, creating information. Similarly, business organizations produce information internally and acquire information externally all the time. For example, the sales department produces sales-related information, the finance department produces finance-related information, the project department produces project-related information, and so on. This information is used in firms to support operational decisions and in other cases, strategic decisions (Zhiliang, 2012). Due to the fast-changing business competitive landscape, the proper use and storage of information is important in a firm's possibility to gain competitive advantage, improve teamwork within the firm, improve innovation and other processes within the firm (du Plessisn, 2007; Ringel-Bickelmaier and Ringel, 2010; Pentafronimos et al., 2012).

The use of the generated information naturally leads us to information sharing. However, information sharing has been established to be critical to collaboration. Essentially, information sharing means information exchanged between parties via a medium. Referencing Sissonen (2006), exchange of information can be described as the synonym for information exchange. According to Li, Y. et al (2014), information sharing is the exchange of critical information that may improve teamwork and cooperation among supply chain members. If information is generated by the sales function of a firm, the information is useful for the sales department and probably for other functional units within the organization. In other words, some information acquired or generated by an organization cut across the organization's functional boundaries. The information generated by the manufacturing department during their manufacturing processes and operations is not

only useful for their production operations, but such information might also be required for the organization's sourcing functions, project functions or even the finance functions. As a result, efficient ways of sharing the possessed information are very critical. According to Elearn (2009), information is only useful if it is available at the right place and at the right time.

Information can be shared either electronically or non-electronically (Yang, T.-M. et al., 2014). Non-electronic method may include verbal or face-to-face communication while electronic communication involves the use of information management systems (Mäkitalo, 2015; Yigitbasioglu, 2016). In terms of electronic methods, advancement in technology has also presented organizations the opportunity to makes use of sophisticated information technology systems for sharing information that can be used quickly and accessed across the organization, and globally if necessary (Elearn, 2009). By filtering the information and only keeping the relevant information – to ensure that the information is fit for its intended purpose – organizations make the relevant information available through shared-access systems. These shared-access systems are different IT tools and platforms which are designed to enable easy and fast free flow of information for organizations when needed. In technical terms, the information technology infrastructure involves the integration and interconnectedness of computers, software and data, to facilitate the seamless and effortless sharing of information through the network connection (Yigitbasioglu, 2016). Information can be easily shared via email, dedicated software applications or programs and databases (Ryynänen et al., 2013). And whilst large amount of information can be shared via the integrated system, it is not just about the amount or quantity of information available but also the quality of the information available (Pierce, E. M. et al., 2014; Bawden and Robinson 2009).

Some studies have been done about information quality. However, the study by Schurr et al. (2002) identifies four dimensions of information quality (based on a variety of other literatures) as:

- Accuracy
- Completeness
- Timeliness
- Consistency

Accuracy simply refers to the conformity between the value received and the value used. For example, if a customer makes an order of 100 items, however, only 60 items are recorded, therefore, the one can conclude that the information recorded lacks accuracy. Completeness refers to the degree to which the information is complete. For example, information may lack or lose completion if it is converted, maybe when converting from one scale to another. Timeliness describes the age of the information. Timeliness in simple terms is a comparison of when the information is acquired until it is given out to the user. In other words, it is about if the information arrived at the user at the time it is needed by the user. Finally, consistency refers to the constant uniformity in formats or

processes of communicating the information. For example, it is rather better to communicate the item weights in a constant unit, for example, in kilograms. Rather than sometimes in kilograms and other times in pounds.

Now, with an understanding of what information sharing is, together with the knowledge of the dimensions of information quality, it presents another question; what benefits does information sharing bring? If we consider the geographical dispersion of project management teams of international organizations, such teams highlight the need for information sharing, as stated in the thesis by Mäkitalo (2015). According to Nidumolu (1995) and Nidumolu (1996), sharing or distributing clear and updated information is critical constituent of an effective project management. Also, according to Szolnoki and Perc (2013), information sharing facilitates and promotes team cooperation (Dawes, 1996), which in-turn promotes business process efficiency. In addition, the research by Mesmer-Magnus and DeChurch (2009), showed that information sharing enables teams to utilize their available information resources efficiently and the research also confirms that information sharing influences teams' outcomes. In fact, Li, Y. et al (2014) claims that through effective information sharing, firms can achieve competitive advantage. As much as there are benefits, information sharing may present one or more difficulties. One disadvantage that may arise from information sharing is information overload (Elearn, 2009). Information overload happens when there is the availability of too much information, meaning both useful and unrequired information. Another disadvantage posed by sharing information is the cost involved due to tools such as hardware and software required for sharing information (Gobey, 2003).

When sharing information, sometimes there are some hinderances which can be described as barriers. Information sharing barriers have been studied in different literatures with a case study approach. However, the study by Ghobadi & Mathiassen (2016) group information sharing barriers in seven categories, as seen below.

- Diversity barrier means conceptual, geographical and difference in time between the team members that may prevent sharing information.
- Perception barrier refers to the team members' characteristics and values that may hinder sharing of information.
- Capabilities barriers refers to know-how and skills-related traits among the team members that may hinder information sharing.
- Project communication barriers refers to communication-related issues which projects exhibit that can prevent information sharing.
- Project organization barriers refers to organizational issues and project conduct that may prevent effective information sharing.
- Project setting barriers refers to task, activities and event-related issues that may prevent effective information sharing.
- Technological barriers refer to technology-related issues that may prevent the effective information sharing.

Furthermore, the research by Niedergassel (2011) also identifies some barriers, which include knowledge is too tacit, unorganized coordination, spatial separation, and goals and expectations of different units are not aligned. As there are barriers, so are there also drivers. And according to Niedergassel (2011), some of the drivers identified are good pre-existing relationship between units, uniqueness of the information to be shared, high level of trust, physical proximity, and frequency of communication between teams.

In conclusion, efficient information sharing helps facilitate decision-making at the individual level, within teams, at functional unit, and at managerial levels. The research by Mesmer-Magnus and DeChurch (2009), showed that information sharing enables teams to utilize their available information resources and the research also confirms that information sharing influences teams' outcomes. According to Szolnoki and Perc (2013), information sharing facilitates and promotes team cooperation and collaboration, which in-turn promotes business process efficiency. However, as much as realizing the benefits of sharing information is wanted, attention should also be paid to the potential cons posed by sharing information.

2.6 Acquired information in the project sales phase

The completion of the project sales phase means the generation of critical information which will be useful during the entirety of the project or at least until the project is completed. Most importantly, information critical to project execution are generated and formulated during the project sales phase. Although, more information is continuously generated as the project progresses, it is however imperative that both the buyer and seller ensure information accuracy during the early stages of the project life. In other words, it is not just the responsibility of the buyer to provide all necessary information. But it is also the responsibility of the seller to ensure to ask the right questions and affirm that accurate information to help the project firm provide the necessary solution to meet the customer's needs is at the project firm's disposal.
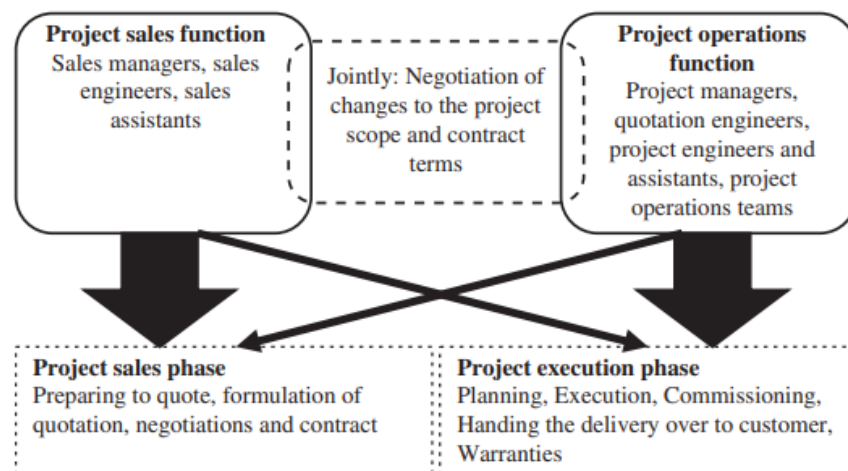
Figure 4. Collaboration of project sales and project operations in project firms (Turkulainen, V. et al., 2013).

The function of the sales unit is critical to value creation, and it involves extensive negotiation between the buying party and the selling party (Kujala, J. et al., 2007; Haas et al., 2012; Momeni and Martinsuo 2019). Proper discussion and understanding of the project details during the sales phase results is a beneficial outcome for both parties. Usually, the discussions form the basis of the information found in documents generated during the project sales phase such as the sales quotation, the sales agreement and other project specific document (Ryynänen et al., 2013). In some cases (or some firms) the project unit provides support to the sales unit during the sales process (Turkulainen, V. et al., 2013). Figure 4 above, Turkulainen, V. et al. (2013) show the examples of the various roles present within the project operations. In addition to performing its main responsibilities, the project operations unit also provides support to the project sales unit during the project sales phase. The quotation engineer present in the project operations team is responsible for providing technical support to the project sales unit when preparing the quotation (Turkulainen, V. et al., 2013). Therefore, although the sales unit owns the sales process, the project unit play a role in the process and information created.
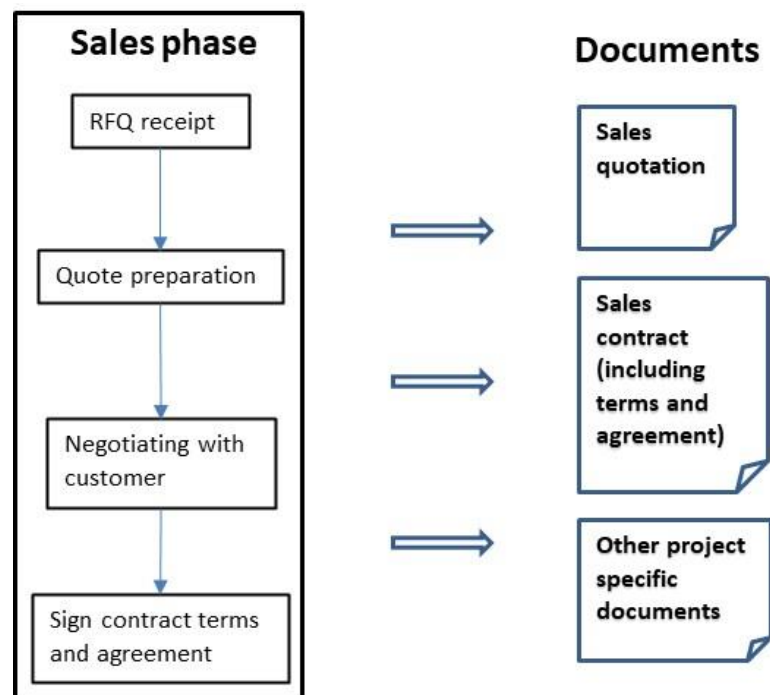
Figure 5. Sales phase and typical output documents.

In the sales phase, information acquisition begins when the seller receives a request for quotation (RfQ). The RfQ forms the basis of the sales quotation which will be formulated and sent to the customer. Figure 5 illustrates the sales process from the receipt of request by the project firm (Savolainen and Ahonen, 2015; Cooper and Budd, 2007) to the documents generated during the sales phase process (Nemethy, 2011; Aamer,

2015). The sales quotation is a document presenting the firm's intention to offer their product and/or service to the customer, and it contains information about the product and/or service, price, receipt date, delivery information, and other information (Aamer, 2015). After the sales quotation has been sent to the buyer, negotiation will take place. The negotiation may require revising and updating the quotation. If the buyer decides to purchase, a deal is made and both parties will put pen to a sale agreement. Depending on the complexity, the sale agreement document may be many pages long or in some cases few pages only (Nemethy, 2011). The document is a binding document sealing the commitment of the buyer and seller to transact according to the details of the document (Aamer, 2015). The sales agreement document typically contains information such as: price, warranties, payment, liability issues, some information about the product and/or service, and other information (Nemethy, 2011). Lastly, other project specific document may also be created depending on the type of additional information which the project firm requires. An example is the product data sheet document. Such document will contain detailed technical information about the product which may not necessarily be present in the sales quotation and sales agreement.

The contents of the documents described above can be divided into three categories: technical, commercial and legal (Savolainen and Ahonen, 2015; Nemethy, 2011; Aamer, 2015). Technical content includes information such as the product and/or service specific information such as product dimensions, parts, materials, quantity, and so on. Commercial contents include information such as price, payment terms, delivery terms, and so on. While legal content information may include information such as warranties, involved parties' details, terms and conditions, and so on. The information generated during the sales phase is not only needed by the sales unit, and sharing the information acquired during the sales phase with other departments has its benefits. Nonetheless, firms must be wary of information overload which can adversely impact firm's efficiency and effectiveness (Elearn, 2009). Some authors though have argued that negative implications can accompany interdepartmental collaboration, such as inefficient decision making, resource conflicts and sometimes project failures (Troy, L. C. et al., 2008; Mishra and Shah, 2009; Swink and Song, 2007). At the same time, based on several findings from other literatures such as Cuijpers, M. et al. (2011), they note that, in projects, information exchange between departments improves new product functional performance, increases workforce flexibility, and enhances the generation of potential new ideas. Furthermore, according to the findings of the study by Cuijpers, M. et al. (2011), firms that engage in interdepartmental information sharing enjoyed improved quality improvements and profited from sales due to this. Therefore, attention must be paid to what acquired information is being shared with other units in the sales phase, also, the right information must be ensured to be delivered to the appropriate unit.

Lastly, to collect the right information, right questions must be answered. Therefore, the right questions must also be asked. Project firms must have a systematic process to collect information. During the project, information can be collected through verbal communication, web communication tools, documentation sharing, via firm's project standard questionnaires, through meetings and interviews, and so on (Hill, 2008). For efficient information gathering, the role of internal communication and information sharing within

the project supplier's firm and between project supplier's firm and the customer is critical (Ryynänen et al., 2013; Ryynänen & Salminen, 2014).

2.7 Synthesis

When conducting research, it is important to consult the existing literatures on the research subject. Consulting the existing literatures on the topic exposes the researcher to the existing knowledge which provides the required background to understand and analyze the research data (Elo & Kyngäs, 2008). Therefore, the researcher deduce that the literature has contributed to the review of the research questions. First research question; how do the units exchange or share information? The exchange of information between project stakeholders is crucial to the success of any project. When project stakeholders share information, they facilitate collaboration, and the information shared must be distributed accurately, efficiently and swiftly (Baldwin, A. N. et al.,1999). Therefore, emphasis should be placed on the quality (Schurr et al., 2002) of the information being shared via non-electronical or electronical means. It is crucial that critical project information is stored and accessible. Firms deploy the use of shared-access system for easy accessibility of their information. This means that information is stored and can be accessed easily with the aid of integrated computers (Pierce, E. M. et al., 2014) using software to facilitate the exchange of the stored information over a network connection. For example, acquired information during the sales phase by the sales unit can be stored on database application(s), and the information can be accessed by the sourcing unit and the project unit in real-time. Having information stored promotes ease of access and the opportunity to retrieve and even update the information anytime and anywhere.

Second research question; what information is generated during the sales phase? Through literature review, it was established that the information collected during the sales phase can be grouped into three categories: technical, commercial, and legal. The reviewed literature show that information collected during the sales phase provide the critical information required by the sales unit to prepare accurate quotations while ensuring that inter-organizational contractual requirements can be fulfilled. In addition, the acquired information also enables the sales unit to understand the customer needs and propose accurate technical solution to fulfill the customer's needs. Likewise, the acquired information can also help the sourcing unit plan for the availability of material resources. The provision of on-time quality information will enable the sourcing unit to plan its activities effectively, which in turn enables manufacturing flexibility for the firm (Narasimhan and Das, 1999). As a result of the information sharing, the sourcing department can build a long-term supplier relationship (Chiang, C.-Y. et al., 2012), because selecting the right supplier is a critical decision. Therefore, allowing the firm to build a long-term relationship with suppliers, which is also beneficial for the project firm. For the project operations unit, in some organizations, this unit may be observed to work closely with the sales unit, even during the sales phase. As illustrated in the study by Turkulainen, V. et al. (2013), the sales unit and project operations unit activities are integrated, and they closely work together in negotiating the project scope and contract terms. The integration also means that the units continuously exchange information to support their activities. During the sales phase the project operation unit provides support to the sales department. In some

firms, the project unit exchange information through the quotation engineer (Turkulainen, V. et al., 2013) to facilitate the sales unit's effort in creating sales quotation. As it can be challenging for the sales unit to acquire the right technical information (Terwiesch, C. et al., 2002) needed to make the quotation. After winning the project, the quote and contract will form the foundation of the information needed by the project unit to fulfill the project objectives.

The third research question; what does collaboration during the sales phase contribute to the units? The contribution collaboration presents to each of the functional units may be observed in the operations of the functional units. According to Mesmer-Magnus and DeChurch (2009), information sharing is central to team performance, team cohesion and the utilization of available resources. Therefore, the acquired information by each functional unit enables the functional unit to gain better understanding concerning the project. While at the organizational level, the functional unit develops cohesion in working together, thereby, improving productivity, work competence and confidence in work relationship (Tjosvold, 1988). The contributions of collaboration can present both benefits sometimes and at other times disadvantages. As the theoretical review shows, sometimes, information can become too much. Besides, the overload of information may lead to increase in cost for the storage and maintenance of the information (Pierce, E. M. et al., 2014), there is also the possibility of the information overload affecting decision making. When faced with overwhelming amount of information, the information may become an hinderance, which may lead to having a feeling of loss of control over the situation (Bawden and Robinson 2009). Hence, firms need to ensure that the information being shared is of high quality to help confront and mitigate the challenges posed by having too much information (Pierce, E. M. et al., 2014).
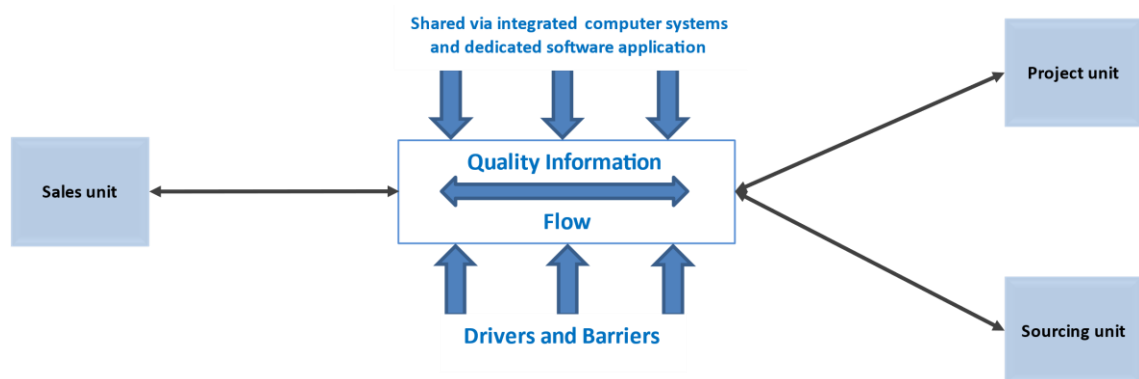
Figure 6. The framework – influencers for information sharing during the sales phase.

Overall, the Figure above illustrates the findings from the theoretical information overview. It shows how quality information shared via the aid of technology, flows from the sales unit to the project unit and sourcing unit, and back to the sales unit. The drivers and barriers forces act on the flow of information. The drivers enabling the smooth flow

of information in both directions while the barriers may cause the hinderance to information flow. Hence, supported with the study by Savolainen and Ahonen (2015), we established that project related information is generated during the sales phase from the information received from the customers. As a result, project-related information is extracted and collected to create information to produce some necessary documents during the sales phase, and information to be shared with project and sourcing functional units.

Furthermore, according to Turkulainen, V. et al. (2013), the project unit and the sales unit must engage in the project sales phase and the project execution phase to align and define the project scope and contract terms. Several literatures have emphasized the importance of fostering the relationships between units in a project-based firm, particularly in terms of knowledge sharing. From a wholistic view that effective information sharing between units of a firm can help promote communication between the units (Ghobadi and D'Ambra, 2012), to a narrow perspective of the importance of communication and information sharing between the sales unit and project unit in a project-based firm (Ståhle et al., 2019; Turkulainen, V. et al., 2013). It is therefore evident that for project units to acquire new knowledge, the project firm's unit or departments must openly learn and share information with each other (Seran, T. et al., 2016), and ensure strong communication between the units, as this is a key success factor for the success of any project (Campbell, G. M., 2014). However, for the purpose of this thesis, it is helpful to know what are the actual information that are shared or exchanged between the focus units, that is, sales, project, and sourcing units. Although, it is noted that several studies have been done regarding cross-functional integration and information sharing in project-based firm, yet only few studies have focused on the actual type of information that is shared or exchanged between the units exists.

Unit interface	Information flows
Sales–Project Operations	• Market information (customer types, customer location, sales and profit, tenders and bids) • Customer characteristics, needs, and requirements (cultural and relationship aspects, and stakeholders involved in the project, etc.) • Technology details (existing systems and equipment) • Contract details (time, scope, cost, liability details, etc.)

Table 1. Information exchange between the sales and project operations unit (Ståhle et al., 2019).

According to the Table 1 above adopted from Ståhle et al. (2019), the information exchanged between the sales and project units is divided into four types: market information, customer characteristics (their needs and requirements), technology details and

contract details. Typically, customer information received by the sales unit is combined with technical information, creating the basis for the contract information which will be processed into project specification information for the project operations unit (Turkulainen, V. et al., 2013). Basically, although the sales and project units are mostly separate units in most project-based firms (Turkulainen, V. et al., 2013), the flow of information between these units is strong and information flows in both directions (Ståhle et al., 2019), therefore, the firm must integrate the knowledge from the different units to achieve the project goal (Ryynänen et al., 2013).

UNITS	INFORMATION GENERATED
Sales unit	Product/service offering, price, delivery terms and agreement, customer needs and requirements, etc. (Nemethy, 2011; Aamer, 2015; Ståhle et al., 2019)
Project unit	Project-related technical information, offered product/service, price, project costs, required materials, etc. (Siegel, 2019; Zwikael & Smyrk, 2019)
Sourcing unit	

Table 2. Information generated by units during the sales phase.

The literature reviews in the previous sections have given a degree of the knowledge required to understand the activities and the roles of the sales, project and sourcing functional units in a supplier based-project firm. Table 2 simplifies the findings of the previous sections. The table shows some of the information generated by the sales, project and sourcing units during the sales phase, and will be useful during the project lifecycle. The literature evidence shows that there is clearly some interaction between the sales unit and the project unit during the sales phase. Also, information is shared between both units during the sales phase, therefore, information is generated by both units during the sales phase. However, material sourcing activities are a part of a supplier project-based firm, the literature does not show that the sourcing unit share information with the sales and/or project unit during the sales phase. As a result, table 2 does not show any information generated by the sourcing department during the sales phase.

Finally, the literature reviews also elaborate the collaboration concept as it has been defined in this study as primarily the exchange or sharing of information. We establish that as much as how information is shared is important, information quality is also very important. Therefore, we briefly discuss four dimensions of information as explained by Schurr et al., (2002), accuracy, completeness, timeliness and consistency. We can therefore conclude that information fulfilling these four dimensions is quality information. Furthermore, we identified the barriers, facilitators, benefits and disadvantages associated with sharing information.

3. RESEARCH METHODOLOGY

3.1 Research design and approach

Selecting the appropriate research approach to adopt when conducting research is important to the outcome of the research. After a fair consideration of the possible choices of approach, the researcher selected the case study approach for this research. According to Kothari (2004), researchers must understand which methods and techniques are suitable for their research and why, therefore, it is imperative for the researcher to adopt the right methodology in solving the research problems at hand. First, as this research focuses on a real-life phenomenon in its own natural environment, according to Yin, R.K. (2003), the case study is an effective approach because case study as a flexible methodology is not restricted, and it focuses on phenomena (Given, L. M., 2008). Furthermore, the case study approach is suitable to study or understand and explain social phenomena where people, groups, small communities, or even large groups are involved (Given, L. M., 2008; Swanborn, 2010), as is the scenario in this research. As explained through the previous sections, this current research poses a phenomenon aimed to be explained by answering three research questions outlined in section 1.2. These research questions posed are aimed to guide in the understanding of the phenomenon, therefore, guiding the researcher to seek the right data. In this case, although it is known that the groups in this study interact but there is little to no understanding of units' information sharing phenomenon during the sales phase. Hence, this shows complexity that can be studied using the case study methodology (Ahn, Y. H. et al., 2009). Furthermore, one of the features of researches where the case study approach is used is that little knowledge of a process is known (Swanborn, 2010), as is the situation in this research.

When conducting a case study, a case (which can be a group, an institution, or an individual) is being investigated to seek answers to specific research questions, thereby, finding and gathering evidence that best answers the research questions within the case setting (Gillham, 2000). During thiss case study research, the researcher uses the qualitative method to seek for evidence. This, therefore, means gathering data through qualitative sources within the case study framework. During this research, data was sourced through interviews, questionnaires, and archival records, and according to Swanborn (2010) and Gillham (2000), these sources of data are of importance in case studies. To analyze the data, the researcher opted to adopt qualitative content analysis method for data analysis. The qualitative content analysis method is an intellectual process of categorizing textual form of data gathered from interview transcripts, recorded observations, questionnaires, and narratives (Given, L. M., 2008). The data analysis method will be explained in detail in data analysis section, 3.5.

This research involves the study of the sales phase activities within a project-based firm. Areas of importance during this research are the sales phase process and activities,

the roles of the project units and sourcing units in the sales phase process, and the information that is being exchanged during the sales phase process. Therefore, the accumulation of data from the individual units is imperative to the success of this research. The collection of data starts from having a clear understanding of how the project-based firm sales phase process is performed and at what stage during the phase is information exchanged with either the sourcing unit or the project unit. Similarly, to conduct a thorough analysis, it is also important to know how the steps during the sales process affects the activities of the sourcing and project units, therefore, it is necessary to collect some information regarding the roles of the project and sourcing units during the project lifecycle.

Furthermore, to answer the research questions outlined in section 1.2, information related data is required. That is, access to the type of information which is currently generated during the sales phase of the projects in the firm. Also, data regarding cross-functional information sharing between the units involved is required. Cross-functional information is complex, and according to Yang, T.-M. et al. (2014), it is a socio-technical phenomenon, that is, information is shared socially and via technological mediums. Therefore, how information is shared in the project-based firm and tools used for information sharing, if any, plays an important role in data analysis.

3.2 Case company introduction

The case company in this research is a project-based firm. The firm is a leading provider and innovator of high-pressure water mist systems to customers worldwide. The high-pressure water mist system is designed to control and suppress fire effectively, while using significantly less water than the conventional sprinkler systems. The system operates by expelling water at high pressure (generated via a pump unit) through specialized nozzles to create fine water mist. Unlike traditional sprinklers which use water to suppress fire, the fine water mist produced by the specialized nozzles helps removes oxygen – one of the main components of fire – from the fire incident area and cools down the fire at the same time. Cooling down helps avoid re-ignition of the fire. This system is advantageous because it reduces water damages that will occur by using other traditional systems. Therefore, in addition to saving lives and properties, overall costs when fire incident occurs is reduced significantly.

As a supplier project-based firm, the company offers its own system which its manufacturers in-house. The company orders parts to produce the critical equipment of the system. Because the sizes of the areas needing protection are not always the same, also, the equipment supplied are not always the same, therefore, the sales projects are not usually the same. Sales project refers to the sale of the company's product and solution. Although products offered by the firm have the same main equipment, however, because the requirements usually differ from one customer to another, therefore, leading to having different sales project in most cases. For example, two different projects might have similar product and solution offering, however, due to different project require-

ments, certain changes might be required to be made to the equipment supplied to individual projects. The change may be an inclusion of additional accessories to the standard equipment (due to the customer's requirements) or sometimes even changes to the standard design of equipment to be supplied (due to the project requirements). In addition, the company has two business areas, land and marine. The land business area specializes in offering the company's systems and solutions to land infrastructures such as hospitals, malls, etc. On the other hand, the marine business area specializes in offering the company's systems and solutions to different kinds of sea vehicles such as yachts, passenger vessel, cargo vessel, etc. This research is focused on the marine business area of the firm.

For the company's system to be sold to a customer, this process typically starts with the sales unit. When the firm's solution has been sold to a customer, this means that the company is expected to design and manufacture the offered solution which was agreed with the customer in the sales contract. Therefore, materials needed for in-house manufacturing need to be sourced and purchased at a competitive price with delivery terms which are beneficial to the firm's project schedule. After the manufacturing is completed, the system is delivered to the customer for installation, commissioning and testing, and handing over to the customer.

3.3 Sales phase description

The research mainly focuses on the early phases of the project lifecycle in the firm, and the activities of the sales, sourcing and project units. The early phase in this research refers to the sales phase of the firm. As a result, this research focuses on the activities performed during the sales phase of the marine business area (Figure 7).
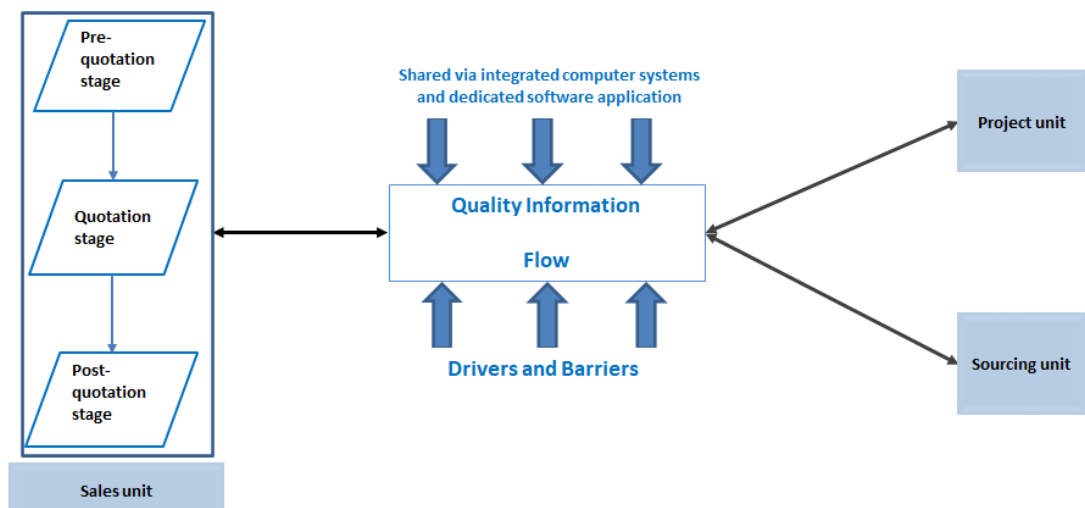

Figure 7. Sales stages during the sales phase.

As mentioned, the sales phase starts with the receipt of an RfQ from the customer. This happens during the pre-quotation stage. The RfQ will typically include the customer's information and the technical project-specific information required to prepare the quotation. The sales unit reviews the information received from the customer and requests for additional information from the customer if required. Usually, this is done by the sales engineer together with the sales manager. The quotation stage is the stage when the sales engineer prepares the quotation and a proposal for the sales case is sent to the customer. To do this, the sales engineer extracts information from the RfQ and in some cases exchange information with the project unit for technical support. The sales engineer will make the quotation ready when the adequate information necessary to complete the quotation is available. The quotation is then sent to the customer. The review and acceptance of the quotation by the customer may go through several iterations with the customer during which additional project-related information might be made available by the customer.

After several discussions and negotiations, which may result in a case of a successful project sale. This means that the customer will accept the quotation of the firm. This organically leads to the next stage, the post-quotation stage. In the post-quotation stage, contractual agreement documents detailing the project agreements between the firm and the customer is prepared and signed by both the firm and the customer. From the firm's perspective, the output documented information of the sales phase includes the signed contractual agreement document, the quotation documents, and the firm's project specific documents. The firm's project specific documents contain the technical information needed for successful project execution, and they are gathered during the sales phase.

Although the project lifecycle for a single project, in the marine business area, may be several months and even in some cases years, yet there are multiple projects ongoing during a fiscal year of the firm. Therefore, the acquisition, proper storage and sharing of project information for every individual project is important for the firm to successfully execute a project. For project equipment to be manufactured according to project specific details, and to be ready and delivered on time, the sourcing unit requires the right information early enough during the project lifecycle to find suppliers. The sourcing unit benefits from early information regarding what has been offered to the customer. For example, if the equipment that has been offered to the customer shall have certain special or non-standard features or how much of certain standard material may be required at a certain point in time. Similarly, the project unit requires the right information from the sales unit in order to successfully perform their project execution tasks. However, although there is constant communication and information exchange between the firm's sales unit and project unit, even after the project sales phase, there is usually no information exchange between the sales unit and sourcing unit. While between the sourcing unit and the project unit, information exchange is indirect and does not happen during the sales phase. This is described as indirect because, it mainly happens via a software platform. In other words, the sourcing unit receives information (via the platform) that has been refined after being shared by the project unit via the platform. On the other hand, information exchange occurs mainly between the sales unit and the project unit is done using company specialized tools. The information shared between the sales and project

unit can be described as direct. This is because the information shared by the sales unit is shared directly as stored and unrefined or unprocessed

3.4 Data collection

The two data collection methods used during this study was interviews and questionnaires, while archival records from one sales case was used as an additional data source. Data was strictly qualitative in nature. The data that could be extracted from personnel that provided information was subject to the nature of their responsibilities during the project lifecycle, the data that could be extracted from them and the nature of their roles within the firm. The personnel who provided information were limited to the units involved, that is, sales units, sourcing unit and project unit. They include, the sales engineers, area sales managers, project managers, and sourcing managers.

The interview selection approach of the individuals that participated and helped to provide the necessary data was based on availability of these individuals and the type of data to be collected. For example, in the project unit, by considering the responsibilities of the project managers, it was decided to interview the oldest and youngest project managers in the unit. The decision to interview the youngest and oldest project manager was reached mainly due to the need to understand the project execution process, and because understanding the project execution process and the project unit's role is an important part of this research. Also, as the younger project manager was new in the firm (and has led some projects), and the oldest project manager has spent several years in the role, therefore, collecting information from such two different sources seemed logical in the interest of this research. However, the selection approach in the sourcing unit was quite straight forward because it was simply based on availability of the individual. The sourcing unit is made up of the senior sourcing manager and two sourcing managers who were all interviewed. Finally, for the sales unit, the approach was based on the focus area of data needed to be collected. Basically, since new build projects were the focus area to collect data, therefore, the individuals that participated in new build projects were consulted, that is, sales managers and sales engineers.

In the sales unit, the sales engineers, the sales managers, and archival records (from an already sold case) were used for providing necessary data. Since this research is focused on new build projects, therefore, it was necessary that sales engineers and sales managers that participated also performed new build project tasks. Questionnaires were sent to the sales engineers. The sales engineers are responsible for preparing the quotations for the customers, and they play the important role of extracting and storing information from the request for quotation documents and provide support to the sale managers. Altogether, six sales engineers that actively participate in the new build projects responded to their questionnaires.

The sales managers play a more pivotal role, as they act as the bridge between the firm and the customer. In the case of the sales managers, the allowance of more explanations in their responses was permitted. Since the sales managers are responsible to

ensure that the sales process runs smoothly, therefore, they ensure the management of the right flow and distribution of information during the sales process.

	Collection method	Data sources	Data description
Sales unit	Questionnaires *Participants = 10* *Responses = 10*	Sales managers and sales engineers	Sales process, type of information gathered, storage methods and flow of information to the project and sourcing units.
Sales unit	Interviews *Sales managers interviewed = 3* *Number of interviews = 3* *Total interview time = 180 minutes*	Sales managers	Sales process, information collected during the sales phase and collaboration with other units
Sales unit	Data archive	Email archive record of a sold case	Mainly collected data about the flow of information during the sale phase.
Sourcing unit	Interviews *Sourcing managers interviewed = 3* *Number of interviews = 2* *Total interview time = 150 minutes*	Senior sourcing manager, sourcing managers and sourcing process	Information required from the sales unit to support the project lifecycle. Sourcing process, what and how information exchange occurs with sales and project units, benefits of early information receipt to material delivery and the role currently played during the project sales phase.
Project unit	Interviews *Project managers interviewed = 3* *Number of interviews = 3* *Total interview time = 270 minutes*	Senior project manager and project managers	Project process, role of the unit during the sales phase, information shared/exchanged with sales and sourcing unit, information collection, storage and transfer, and information required by the unit for improve project execution.

Table 3. Data summary

In general, the data collection process was painstaking. The data collection period spanned a period of four to five months. During this period, questionnaires were sent,

interviews were conducted and data from archival records were collected. As summarized in Table 3, altogether, in the sales unit, questionnaires were shared within the team. Altogether ten questionnaires were sent out within the sales units, six to the sales engineer and four to the area sales managers. All ten questionnaires were responded to. The questionnaire sent to sales managers was an open-ended type. In addition, due to personnel availability, only three separate interviews were conducted with different sales managers, and each interview session lasted approximately one hour. The interviews were semi-structured and took the form of a discussion (Savolainen and Ahonen, 2015). This simply means that the interviews followed a pattern such that the interviewees answered a set of questions, with the possibility of the interviewer to develop new ideas of questions during the interview. The main questions asked during the interview followed the same pattern as in the questionnaire questions sent to the sales managers. On the other hand, the questionnaires sent to the sales engineers was closed-ended questionnaires. These questionnaires were designed to collect data regarding the new build quotation process. In addition to the data collected from the sales personnel, email archive of an already sold case was also a source of data. This was mainly data from email conversations during the sales phase of an already sold case and data collected by consultation with the responsible area sales manager of the sold case. The aim was to understand as much as possible, what information was generated and the information flow between the respective units, by using an already sold case as a study example.

To collect data from the sourcing unit and the project unit, once again, the semi-structured interview method was used. The interviews of each project manager were conducted separately. In addition, the senior project manager was also interviewed. A similar approach of interview was also adopted in the sourcing unit. The senior sourcing manager was interviewed, followed by the two sourcing managers of the unit. However, due to time constraints the interview of the two sourcing managers was conducted as a joint interview. The interview with the global sourcing manager lasted approximately an hour. While the other joint interview of two sourcing managers lasted approximately an hour and thirty minutes. In the project unit, three separate interviews were conducted. Two project managers were interviewed separately, and each interview lasted about one hour and thirty minutes. The third interview was with the senior project manager of the unit. The interview lasted approximately one hour and thirty minutes.

Finally, data collection was focused on formulating questions aimed at answering the research questions. The theme included understanding the sales process, and especially the activities or roles the different units played during the sales phase. Also, another focus was what information was generated, how the information is stored and the flow of the information, and what information (if any) is exchanged between the units, mainly during the sales. The list of specific questions asked during the interviews can be seen in the appendix section.

3.5 Data analysis

According to Given, L. M. (2008), a method of analyzing a wide range of data (in form of text) which may be collected via interviews transcripts, open-ended questionnaires, narratives, and so on, by reducing the data to become more understandable and deriving meaning from the data, is qualitative content analysis. Qualitative content analysis (QCA) can be done either by an inductive approach or deductive approach (Mayring, 2000; Elo & Kyngäs, 2008; Given, L. M., 2008). As a systemic text analysis tool, QCA is a methodological controlled analysis of qualitative data (or text) within their context of communication and following the steps of established analytical models (Mayring, 2000). According to Elo & Kyngäs (2008), the inductive approach is adopted when there is not enough knowledge about the case phenomenon and during analysis, the categories formed are derived from the content of the data being analyzed, while the deductive approach is adopted when the purpose of the study is theory testing (or when the analysis is based on existing knowledge), therefore, categories used are derived from existing theory on the subject, and it is about making the general knowledge specific (Burns & Grove, 2005). Studies have shown how the inductive approach is used in analysis for creating themes based on the data collected, further leading to grouping the themes into categories by finding similarities between the themes (Momeni & Martinsuo, 2019), and according to Given, L. M. (2008), reducing the data to make sense of it.

To analyze the qualitative data at hand, the researcher decided to follow the conventional content analysis method as described by Hsieh & Shannon (2005). However, other QCA methods as in the literature are directed content analysis and summative content analysis, neither of which is appropriate for the analysis of this qualitative data (Hsieh & Shannon, 2005). The conventional content analysis method is not to be confused with the grounded theory method (Corley & Gioia, 2004), which goes beyond to develop a theory of the phenomenon. The conventional content analysis process can be described in the following five steps (Hsieh & Shannon, 2005; Moretti, F. et al., 2011).

1. Read the whole text repeatedly in order to be immersed in the text and gain a wholistic understanding of the text. Also, where possible, highlight phrases, statements or sentences that align with the theme of the research questions
2. Take notes of initial analysis and impressions of the text, and code the highlighted phrases.
3. Sort and identify codes/phrases with similar concepts into mutually exclusive categories. This category development simply means grouping codes into meaningful clusters.
4. Review the categories that have been created and create new categories if needed by further merging categories.
5. Write out definitions for categories by organizing the linked categories into a hierarchy of areas, categories and subcategories.

Highlighted phrases (step 1)	Content area (step2)	Primary categories (step 3)	Identify linked categories (step 4)	Organize linked categories (step 5)		
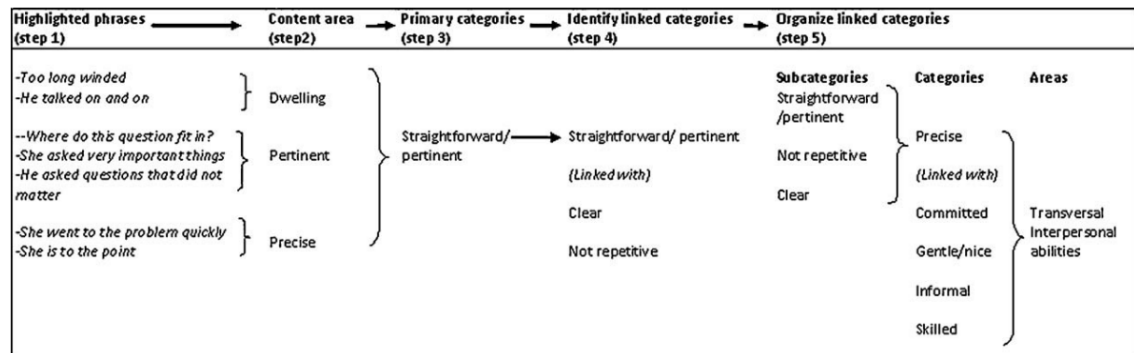
Figure 8. The five steps for text analysis: from units to categories (Moretti, F. et al., 2011).

Figure 8 exemplifies the conventional content analysis method from the units of texts developed after immersion in the text to the development of categories and resulting to the merging of the codes developed.

The analysis phase of this study was initiated by transcription of the interviews into text, and the gathering and sorting of all the collected textual data collected after the transcription process. Going forward, in accordance with Hsieh & Shannon (2005) and Moretti, F. et al. (2011), the researcher followed the five steps of the conventional content analysis. Hence, first, the researcher properly organizes and sorts the transcribed interview data. The text had to be read through several times. Reading and rereading provided the author with good insight of the text, immersed the researcher into the data and provided a better understanding of the textual data. At the same time, the initial thoughts and reflections regarding the data are also noted (Hsieh & Shannon, 2005). By following the inductive category development as described by Mayring (2000), several comments were highlighted, and codes were developed by using words from the data (where possible) that capture the thoughts of the interviewee or the concept being explained.

| 1st Order Concepts | 2nd Order Concepts | Aggregate Categories |

1st Order Concepts:

- Project types
- Sales unit standard information to share with sourcing
- Collecting project non-standard parts information during the sales phase
- Non-standard components information in sales phase
- Standard vs non-standard parts

→ **Product standard components and non-standard components**

- Project information
- Project technical information may be missing
- Knowledge to search for the right information
- Project data gathering collection problems
- Personnel possessing the adequate knowledge to search for the required information
- Pre-contract sales case analysis
- Project process required information from sales unit
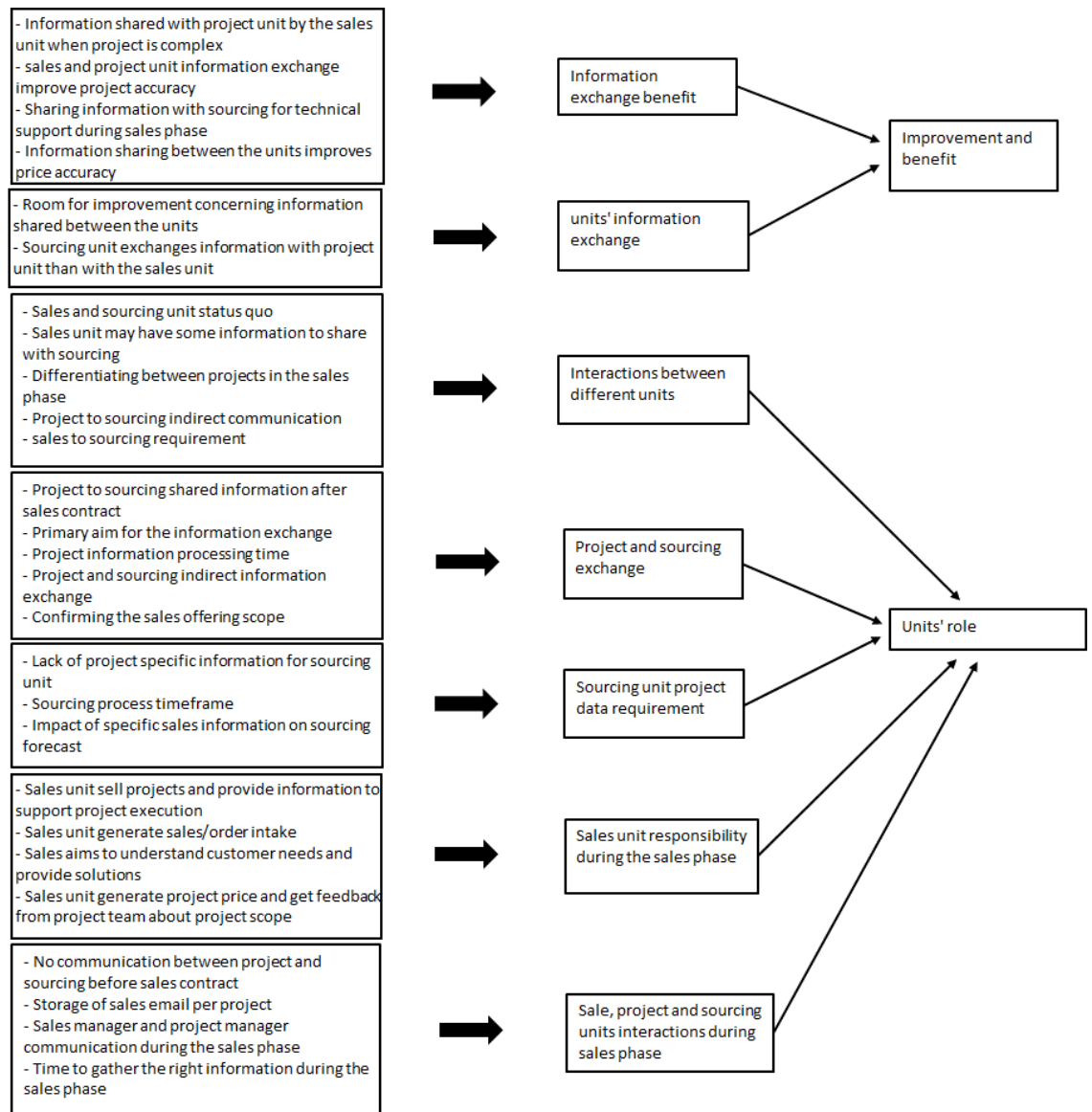
→ **Sales case specific information**

- Information processing barrier
- Information might be hard to find because it is stored incorrectly
- Information may not be up-to-date
- Information well stored is easy to find
- Project related data may **not** be easy to find

→ **Barriers**

- Complexity of the project make gathering project information difficult
- Non standard project requirements information must be paid attention to.
- Different projects have different scopes. Therefore, information must be collected per sales project

→ **Project complexity and data collection**

- Finding the right information may be tricky during the sales phase
- Detailed information collected during the sales phase for project execution
- Primary sales information required by sales contract completion
- Importance of project data collection during sales phase
- Importance of project data collection during sales phase
- Primary data collected during the sales phase
- Project process effect on sales phase
- Improper definition of data to be collected during the sales phase
- Project kick-off meeting events

→ **Information gathering during the sales phase**

These lead to the Aggregate Category: **Information Complexity**

- Information sharing tool use can be improved
- Project and sales information sharing
- Storing and archiving sales case related emails
- Sales unit information quality matters to sourcing
- Information exchange timing
- Required sourcing information content
- sales forecast to sourcing

→ **Information quality, timing and sharing tool**

- Project specific technical details are collected during the sales phase
- Information during the sales phase affect project lifecycle
- Technical information gathered from the RFQ must be collected and adequately stored

→ **Project specific information**

- Sometimes, it might be difficult to know what information to look for
- Company specific tools are used in the sales process
- Project specific tools/programs support the sales process
- Tools help to share information with the concerned parties
- Tool/programs is efficient if used correctly

→ **Information gathering tools**

These lead to the Aggregate Category: **Information collection and storage**

Figure 9. Data analysis and development of aggregate categories

Altogether, there were over 70 highlighted comments or codes developed from the total qualitative data available. Moving forward, the researcher had to identify the commonalities or similarities between the existing codes that have been created in order to merge such codes to create primary categories. However, while creating categories, not all the codes were used for category creation as some were not important, hence, some codes were dropped. It was important to focus on codes that were more related to provide answers to the research question. As seen in figure 9, bringing together different codes to create new categories, that is, the 2nd order concepts, reduced the high number of codes from over 70 to about 15 categories, or in other words, 15 different meaningful groups of codes (Coffey & Atkinson, 1996; Patton, 2002). Next step, the researcher identified connections or relationships between different categories and how to explain these relationships. This was important for recording the findings of the analysis. The researcher unearthed new knowledge hidden in the qualitative data available from the perspective of the interviewees. Furthermore, a hierarchy of importance of the categories

was created. In other words, the categories were put in order of their importance with respect to the case study phenomenon. Next, is to discuss the results of the analysis and interpret the findings thereof. The result of the analysis is presented in section 4, and discussion in section 5.

4. RESULTS

4.1 Introduction

This study focuses on information as it is generated in or during the sales phase in the project-based case firm, and to understand how this information is exchanged between the units and the needs for the information within the units. Therefore, the study approaches the relationship between the units from an information exchange perspective, that is, the generation, storage and use of project information were important. However, during the research, it was recognized that useful information for other units does not have to only be generated during the sales phase. Information useful to other units can also be generated from other sources of information.

Consequently, the study yielded interesting results which will be described in this section followed by a discussion of the results. The results of the research showed that the firm ensures to collect as much as possible project-related information for each project during the sales phase of each project. Also, the project unit provides technical support to the sales unit, and from time-to-time information is shared between the project unit and sales unit during the sales. Likewise, all project-related information gathered during the sales phase is shared with the project unit after the sales contract is signed. However, the interviewees from the sales and sourcing units admitted that there is basically no information sharing between both units.

Based on the analysis (as described in the previous section) of the qualitative data gathered, four aggregate categories were identified. These categories which are explained in more details in the next sections sheds some light on the information collection methods of the firm, how the information is used, and units where the information is shared. That is, the categories are defined as related to the project firm. These categories are: information complexity; information collection and storage; improvement and benefit; and units' role. This section finishes with a summary section to simplify the meaning of the result of the analysis.

Therefore, to improve work processes that will translate to gaining competitive advantage, efficient cost control, and better management of available resources, the motivation of this research is to study and understand the relationship (as regards information sharing) between the sourcing unit, sales unit and project unit during the project sales phase. What the relationships between these units contributes during the sales phase and explore what benefits information sharing contribute to the project firm.

4.2 Complexity of the information collected

According to the findings, the information to be collected can be complex and it requires someone with the right knowledge to know what to look for during the early stages of the project phase. Therefore, information complexity is as a result of the difficulties and barriers associated with acquiring the required project-related information during the sales phase. Usually, when a request for quotation is received from a customer, the firm will receive several documents from the customer which are specific for the project. Contained in the documents received are specific project-related information that must be extracted during the sales phase by the firm.

Going forward, the sales unit must now extract the vital information needed to prepare a competitive offer for the customer whilst also meeting the project-specific requirements set by the customer. In addition, the information collected must also be stored properly and recorded for future reference. Although, when the RfQ documents are being reviewed, the firm's standardized questionnaire or template for extracting information serves as a guide for the person responsible to prepare the quotation – usually the sales engineer – to know what information to search for from the documents. However, in some cases, the firm's template may not be accurate enough to capture more complex information from the RfQ. For example, there are situations where customers sometimes make specific requests or when the customer's design may require a more creative solution. These types of information must be captured early enough during the sales phase. In addition, the complexity of the information also has to do with the individual extracting the information. According to the senior project manager in this regard…

…If the area sales manager reads the specification, how can he or she know what is the relevant information? So there again the whole [question] of the technical knowledge of our system comes in…

Furthermore, the interviewee also said that…

…Collecting all the relevant information for the project from the documents in some structured way rather than everyone being forced to read the whole specification…

Therefore, not possessing the knowhow to find the right information from the set of project documents received is a barrier to acquiring the required project-related information needed by the firm. Also, in cases where the customer's project needs warrant the introduction or need of non-standard design or parts. Such needs must be codified as information and stored during information gathering. Non-standard design or parts refers to the parts that are not offered in the standard equipment offered by the firm, or they can also be design changes that alters the firm's standard equipment design offering. This type of situation becomes even more difficult to handle because according to the sales engineers, each engineer prepares five quotations on average per month, and it takes on average about a week to prepare a single quotation for a customer after receiving the customer project information. In addition, the senior project manager also emphasized that…

…If it is a big [customer and technical specification] document, there is not really time for anyone to look through it properly, and then we might miss some information…

For the sales unit, during the bidding stage, time is of the essence. Also, customers usually want a fast response. Similarly, the sales unit also seek for technical support as soon as it is required. Although, technical support provided by the project unit to the sales unit have in some cases helped to mitigate the knowledge gap problem, however, the provision of technical support does not happen during every single project's sales phase. Nonetheless, sales managers have said during the interviews that they share information of some sales cases with the project managers during the sales phase to request for technical support. This does not mean the review of the whole customer project specification document is done by the project managers before the contract is sold. But, simply put, this shows that there is information exchange between the sales and project units during the sales phase of some projects.

4.3 Information management – collection and storage

For the project firm, the proper management of information is important for the success of the project. As mentioned in the previous section, the project-specific information collected from the documents received from the customers are stored for future reference. In terms of information sharing between the units, this usually happens either via electronical or non-electronical means.

Based on the research findings, during the sales phase, the sales unit shares and exchanges information with the project unit often (as illustrated in the figure 10 below), however, information sharing between the sales and sourcing units does not normally happen. On the other hand, information sharing between the project unit and the sourcing unit is basically non-existing during the sales phase of the project.
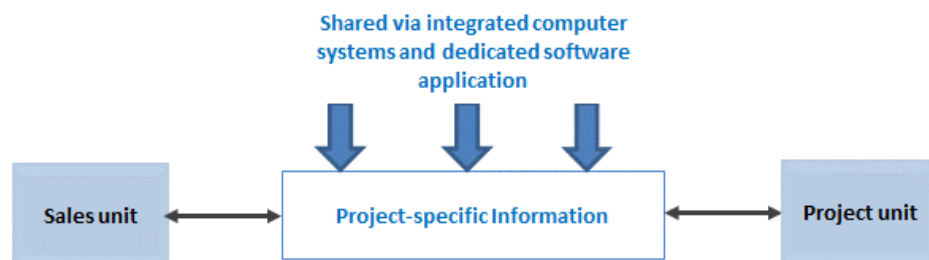

Figure 10. Information exchange between the sales and project units.

Information sharing between the sales unit and project unit can be described to happen for two needs. The first need is to support the sales unit's technical needs during the quotation preparation stage, and the second need is to collect and record valuable project information which will be shared with the project unit later during the project lifecycle.

For the first need, usually, information is shared either via emails or verbally (or face-to-face) between individuals from both units. This is usually because some technical questions arise when preparing the quotation, that is, after receiving the project specification from the customer. While reviewing the RfQ documents, project-related technical questions are usually needed to be answered. The project unit provides support to the sales unit in this regard. However, when information is shared verbally, the outcome or important part of the information may not be stored, and therefore, the key content of the information remains with the individuals involved in the information exchange.

Also, research findings revealed that sales unit in some cases may also share the RfQ documents or specific documents with the firm's engineering unit for technical support during the sales phase. According to a sales manager…

…if there is some special project which requires some special engineering. Then we ask from engineering department that if this can be done or if this can't be…

…But in normal projects where we don't need special engineering then, we don't share information with Engineering department before we get the deal…

For the second need, to collect and record valuable project information. The collection and storage of valuable information is important for the sales phase and later phases of the project lifecycle. The project firm sales unit uses a standardized template to collect this information from the RfQ documents received from the customer. These are necessary information needed to ensure successful project execution, and the information is shared with the project unit during the project kick-off, that is, after the sale has been successfully completed and contract has been signed. Although, the information is collected during the sales phase, the information sharing happens after the sales phase is completed.

The stored information is then shared via an ERP software tool which allows the information to be accessible in real-time and for future purpose of the project, when needed by other units. In addition, the standardized template helps to know what information to search for in the customer specification documents received. However, the template does not guarantee that all the valuable information will be collected.

4.4 Contribution and benefit of sharing information

As already established in the previous section, the sales unit does not exchange information with the sourcing unit during the sales phase. According to one of the sales managers…

…Normally we do not share information to sourcing, but we might get some information from the sourcing (unit) if we need…

Furthermore, the sales manager explains that…

… Seldom what happens more is that we ask some information from sourcing regarding delivery terms or something like…

And as regards information exchange between the project and sourcing unit, the senior project manager stated that…

…In a dream world where everything would run smoothly, project department would not communicate with sourcing [department] at all. Basically, not directly.…
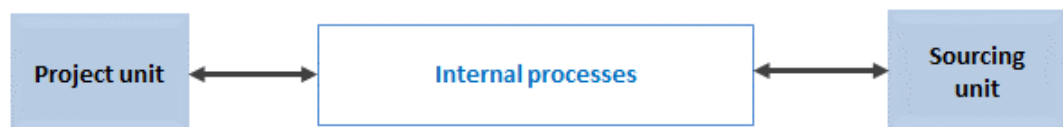

Figure 11. Indirect information exchange between project and sourcing units.

"Not directly" as stated by the manager implies that although the sourcing unit requires information from the project unit, the information is not given directly by the project unit. As illustrated in the figure 11 above, information required by the sourcing from the project is shared via coordinated internal process, and this is only occurring after the sales phase is completed. Therefore, based on the research findings, it is clear that during the sales phase, information sharing, or exchange mainly occurs between the sales unit and the project unit. The research findings support the literature results as earlier summarized that no information is generated by the sourcing unit during the sales phase of a given project.

Based on the current situation, there is a lot of information but not enough being shared. According to a sales manager…

…But in my opinion, we have a lot of information, which, if it was shared with the sourcing department, could be useful for them.

…We have this information, but it is not shared, and it is not used.…

This implies that from the sales viewpoint, there is information available that can be shared with different units. Besides the information gathered by the sales department (during the sales phase) on individual project, which are usually project specific, the sales unit also generates additional sales information which may be useful to the units. Based on the research findings, the sales additional information is derived from sales data from past and ongoing projects. This sales information will help to provide better understanding to the sales activities and can also help the other units perform their roles and responsibilities during the projects more effectively. Although, the availability of diverse information presents positive potential for the firm, also, the access to large volume of

information also presents the possibility of information overload. Therefore, in order for the firm to use the information wisely, they must understand the information and try to identify who needs what information and when.

Overall, sharing the information available with the other units comes with benefits that directly affect and benefit the individual units and the project firm. Moreso, during the research, interviewers from each unit agreed that benefits can be realized through sharing the right information with the right unit. Most importantly, interviewers agreed that information exchange can bring significant contribution to the firm as it will improve the firm's project execution.

4.5 The role of the units

An important part of this study is to understand what the roles and responsibilities or activities performed by the individual units are. To find out how the actions (and the information shared) by a unit affects the activities of another unit. During the research, the researcher was able to establish how collaboration between the three units works, and the main responsibilities of the individual units. Understanding the main responsibilities of each unit is important because it gives more insight to establishing if collaboration is needed between the units.

…I would say that the main responsibility is to sell a project that is feasible, considering both commercial and engineering aspects. The projects should be manageable for the project and sourcing departments…

The sales unit drives revenue generation for the firm by always ensuring to acquire profitable deals for the firm.

Based on the research, the sales manager plays a very significant role to ensuring that customers are kept happy and profit margin for the firm is favourable. The sales engineer provides sales technical support throughout the sales process. The firm's sales unit responsibilities do not just end after the sales phase is completed, instead its responsibilities extend beyond selling the project to the customer.

…sales unit for new build plays a critical role for setting a base for the project life cycle. The sales unit is responsible till the project is commissioned. Only then it is handed over to aftersales and service. So whatever information is produced during the sales phase, designs, project technical details right from the bidding stage till it is commissioned set the base for the project lifecycle…

…Ownership of project remains with sales (unit) till it is commissioned…

Clearly, the sales unit has a duty to generate information which can be shared with the respective stakeholders within the firm. The information acquisition begins from the bidding stage. The sales unit (or mainly the sales manager) will remain involved in the

project execution until the project is commissioned at the customer's site. The needs for the project unit to successfully perform its tasks during the project execution phase has its roots in the sales phase. However, a lot also depends on how the operation of the project unit is conducted.

…Main objective (of the project unit) is to fulfil the contract in set budget and time frame…

To achieve its objective, the project unit of the firm is structured in such a way that project managers are assigned to projects which they are usually responsible for from start to finish, that is, until the equipment is handed over to the customer. The project managers work with the sales manager through the project execution process. For the lead project manager to perform execution of the project, information collected serve as the base information for the project execution. The sales information is collected in a standardized document called the kick-off sheet. The kick-off sheet document is very critical to the project execution process, therefore, the expectation is that the document should be filled before the execution process starts. According to the project managers…

…(the project unit) needs fully filled kick-off sheet as it covers all agreed details and [the firm's] quotation…

…Kick-off sheet, order and technical specification are the most important documents we follow when we do the (project) planning…

As the quest to understand the use of sales information extends beyond the sales phase, the research shows the role of the sourcing unit. The sourcing unit in a supplier based-project firm has a unique role. The sourcing unit's role directly affects the capability of the project firm to complete the delivery of its product (for a given project) to its customer. Therefore, the unit strives to ensure the availability of materials needed for the manufacturing of project products. The sourcing unit achieves this through its supplier selection process.

…the supplier selection process is a description of selecting a supplier and/or product with regards to the purchasing of a product by evaluation elements such as cost, requirements, overall quality, stability of the supplier, time-to-market and traditional partnerships…

Hence, the sourcing unit makes it possible for the firm to have suppliers readily available to supply materials need by firm at the required quantity, at a cost-efficient rate and good quality. From the sourcing unit's perspective, because of the amount of time and resource required for the sourcing process, it is inefficient for the sourcing unit to invest its time and resources to source for suppliers for materials for projects that are still in the sales phase or when the sales contract is not yet signed. Also, for standard production materials, there are existing processes in place to ensure that the materials are supplied to the firm. However, for non-standard materials that may be needed for certain projects, they may raise concerns during the project lifespan if accurate information about their

material and need requirements are not shared on-time with the sourcing unit. Nonetheless, some sourcing activities are influenced by the sales phase decisions. For example, the Global Sourcing Manager stated that…

…It is important to understand if there are specialties that require new supplier introduction process in sourcing [because new supplier introduction takes roughly about 6 months, and this is the most complicated scenario] …

Basically, to ensure timeliness during the project and that the product can be delivered on time, the sourcing unit must proactively identify their suppliers. Hence, if there are certain factors that might affect the supplier selection process such as specific information regarding customers' needs or changes in customer requirements, such information must be privy as soon as possible to the sourcing unit.

Generally, each unit's role is important during the project process. Also, there are some significant influences of the sales phase on the other units' activities during the project lifecycle as revealed during the research. Therefore, it was imperative to understand the roles each of the units play in order to identify how to best improve the collaborative situations of the three units.

4.6 Results summary

The findings of the analysis of the qualitative data gathered during this research helps give an insight to how customer and technical information is processed and how project-specific information is generated. This current research aims at improving collaboration between units and the data gathered reveals four aggregate categories described in the previous sections. These categories in short are used to categorize and define the multiple different activities that happen in the project firm. Therefore, the result has been summarized in the Figure 12 below.
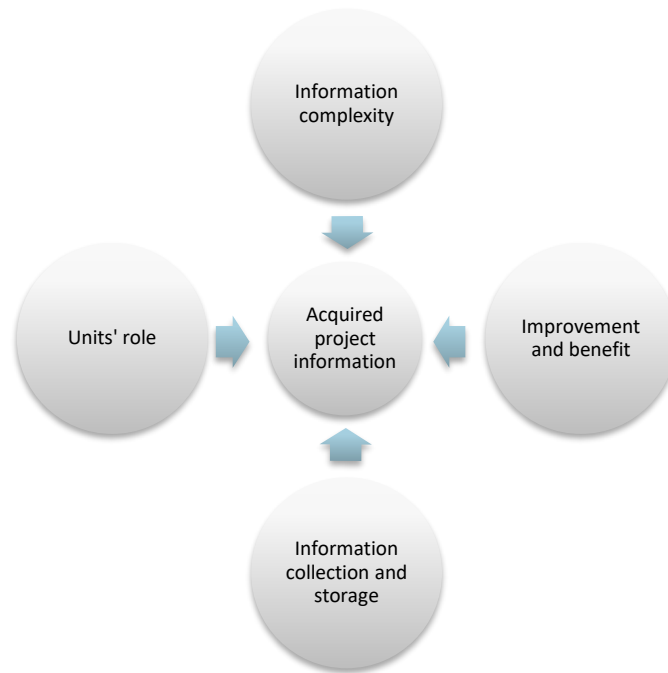
Figure 12. Data analysis summary – aggregate categories in relation to the acquired project information

As in figure 12 above, it illustrates that the four categories directly affect the acquired project information exchange that happens in the firm. This research has revealed the importance of project information during the sales phase and the need to have the required level of knowledge to navigate the complex information generated during the project. Firstly, how complex the information to be shared is might affect the information exchange between the units. This might affect in such a way that the right information is not shared with other units or not enough of the information is shared, that is, some information may be missing from the shared information. A situation such as this may lead to loss of the sales contract. Or if the project sale was made, it may result in poor project execution and even financial losses for the firm in the worse scenarios. Secondly, an important part of exchanging or sharing information is gathering and storage of the information to enhance the ease of sharing the information. Certainly, not all the information contained in the customer documents are needed by the project firm. Therefore, the necessary information must be extracted and stored in the right format. In addition, the right type of tool for passing the information to the other units is also important. Considering the improved technological advancement in today's world, enabling the information to be accessed by individuals in real-time in different locations is now highly possible. Ultimately, proper collection and storage of information not only enhances the exchange and sharing of information, but it also allows for the success of the project. Since the necessary information is collected early on during the sales phase (and consequently during the project), and the information is stored and can be accessed whenever and wherever needed.

Thirdly, exchanging and sharing information can bring about improvement and benefits to individual units, also, to the firm in general. The more information privy to the personnel and units, the better the decisions that can be made. However, it is the opposite when units are not privy to the accurate or any information at all. For example, sourcing unit can have significant benefits from sales forecast information shared with the unit. This is because of the lengthy period required to find the right supplier and negotiate beneficial contracts suitable for the project firm. Acquiring early information about the sales unit's needs will help the sourcing unit to be proactive in its activities. Hence, information sharing and exchange between the units will lead to improvements in the individual unit's performance of their responsibilities and create improved performance benefits for each unit and the project firm. Lastly, the analysis revealed that the units' activities affect project information sharing within the project firm. In other words, project information sharing is an important part of the activities performed by each on the three units. The sales units in performing the responsibilities will collect and gather information during the sales process to create the sales quotation and make an offering to the customer. The project information generated will also be shared with the project unit to enable them to make better decision regarding resource allocation for the project. While the project information is necessary for the activities of the sourcing unit to aid the unit in making better decisions in their working processes.

In general, throughout the interview process, the interviewees from the different units emphasized the need to share information and the benefits that can be realized from such collaboration. Also, during the sales phase, most of the project-related information is generated. Even though, this research was focused on collaboration during the sales, it was also noted that some of the project-related information generated during the sales phase are only shared with the other units in the later stages of the project lifecycle. This clearly emphasizes the importance of sales unit collaborating with other units during the sales phase of the projects.

5. DISCUSSION

This present research has explored the supplier based-project management firm, with a particular focus on three units of the firm. Also, this study explored the collaborative efforts that exists in a supplier-based firm between selected units and how their efforts can be improved. With proper collaboration, complex projects can be monitored and controlled, boundaries are broken, and teams work more effectively Landau (2016). The result of this research supports the literature that project information is generated by the sales unit during the sales phase of a project in a supplier based-project firm. In addition, the research shows that although information exchange occurs between the sales and project units, information sharing between the sales and sourcing units needs more focus. Furthermore, this section discusses how this research has provided answers to the research question posed in section 1.2. Therefore, each research question is reviewed and compared to the findings from the empirical studies conducted in this case study. Lastly, recommendations will be proposed in response to the initial motivation of this research based on findings and literatures.

To define ways to enhance collaboration, the research questions posed by the researcher aimed to understand the activities performed by the individual units involved in the case. Each of the research questions was tackled during the course of this research, and some interesting findings were made in relation to the existing literatures. The first research question posed asked; *How the sales, project and sourcing units exchange or share information during the sales phase?* Information collection and sharing is an integral part of the project lifecycle (Driessen and Ende, 2010), also, information sharing during the project lifecycle is fundamental to the completion and success of the project. It is important to ensure that all information valuable to project execution in the later stages of the project are collected and stored appropriately.

Findings from the research shows that information sharing via electronic medium is mostly used by the case firm. The information is shared over an IT platform where the information is also stored. This allows the information to be readily available and easy to access by employees with access to the platform. In terms of how the findings of the research relate to the literature findings, evidence from the case study shows that in the case firm their means of sharing information supports the literature findings. Empirical findings show that collaboration between the units is done verbally or face-to-face between individuals, and in other cases, especially when it involves the sharing of documented information, electronic means of communication is used (Mäkitalo, 2015; Yigitbasioglu, 2016). However, considering how information is shared or exchanged during the sales phase, the findings does suggest that information sharing, or exchange is done mainly via electronic medium. Although, the findings suggest, that the origin of information to be shared is usually from the sales unit. This is significant because it supports the theoretical studies regarding the important roles played by the sales managers and sales engineers during the sales phase and the support function performed by the project

unit (Turkulainen, V. et al., 2013). The sales unit is the bridge between the project firm and the customer. They form, build and sustain relationships with the customers to ensure sustainability for the project firm. Furthermore, the sales unit's capability with the support from other units is important for the acquisition of critical information during the sales phase. The information, in some cases is shared with other units verbally, while in other situations, the information is shared via the firm's IT applications and emails (Ryynänen et al., 2013). However, the firm still ensures the proper management of information and its dissemination (Elearn, 2009).

The second research question asked; *What information is generated during the sales phase of the project?* Information is a necessity during the entire project lifecycle. However, the right information is also needed to ensure its usefulness during the project lifecycle. Research findings showed that during the sales phase, important project related information is generated. First, important technical information needed throughout the project lifecycle is gathered and stored. Basically, this technical information include project offering technical information and customer technical requirements. Second, project rules regarding issues such resource availability and product delivery information are also generated. Third, project financial details which includes information such as sales price, payment structure, and payment method. This finding supports the literature as described by Ryynänen et al. (2013).

According to Savolainen and Ahonen (2015) and Cooper and Budd (2007), the RfQ received by the sales unit is the source of information for the sales unit quotation preparation. Therefore, extracting accurate information from the RfQ is crucial to the different sections of the quotation (Aamer, 2015). Information is usually extracted from the RfQ documents received from the customers. Findings of the research also support the literature according to Turkulainen, V. et al. (2013), that the sales unit uses the support of the project unit during the sales phase to create a competitive offer for the customers. During the sales phase, some of the information extracted from the customer documents are directly used to prepare quotations for the customer. According to the research findings, technical related information such as product information, materials, resources, price and contract terms are some of the information generated during the sales phase. The information is included in the quotation documents, project-related documentation which are used throughout the project lifecycle, and in contract documentation.

The third research question asked; *What does collaboration during the sales phase contribute to the units?* In accordance with the definition of collaboration in this research, this question can be said as what does information exchange or sharing contribute to the units? Exploring this question through the research analysis resulted in some interesting comments made by the interviewees.

The analysis and responses during this research revealed some interesting perspectives on the potential contributions of collaboration. Interviews with the managers during the research highlighted the potential benefits of collaboration between the units. For example, according to the sourcing managers, collaboration with the sales unit could result in…

…better purchase prices for materials, reduced warehouse turnover and better material lead times…

Findings showed that collaboration between the units ensures information transparency and easy access to information whenever it is needed, across the collaborating units. For the sales unit, getting the right support whenever it is needed is easy when the sales unit shares information with the project unit. In turn, this helps the sales unit to provide the right solution to customers. Also, information sharing between the sales and the sourcing unit will ensure that the sales unit is aware of material availability, therefore, help the sales unit agree a feasible delivery schedule with the customers. For the project unit, findings show that information exchange with the sales unit occurs throughout the project lifecycle. However, information exchange between the two units can aid in early labor resource planning availability for the project units, as the resource is limited and a very important part of the project execution. Information exchange between the sales and the sourcing unit provides the sourcing unit with sales forecast information, thereby, helping the sourcing unit to estimate the firm's project material needs. In addition, the sourcing unit based on the information will be able to source for suppliers and negotiate better contracts with the suppliers.

The resulting response to this research question supports the findings from the existing literature. As a result of information exchange, necessary project information is available to other units, thereby, aiding the teams to better plan and utilize their available resource more efficiently (Mesmer-Magnus and DeChurch, 2009). In other words, the units can be more productive with the resources available. The inter-departmental collaboration between the sales and the other units can provide technical support to the sales unit to assess the RfQ documents received from the customer and develop agreeable terms for the project firm in the contract (Turkulainen, V. et al., 2013).

In addition, collaboration also supports one of the roles of the sourcing unit, which is to support the project through proactive integration and coordination of suppliers (Monczka and Trent, 1991), also, to enable flexibility during the project (Narasimhan and Das 1999). Mostly, this research highlights benefit of collaboration at the unit level. While some benefits are realized at the unit level, these benefits can also translate to organizational level benefits. However, further research may be required to study how the unit level benefits translate to organizational level benefits.

The findings of this research led to the understanding of how information is generated during the sales phase of the case firm and what the information generated is about. The findings also support the literature studies regarding the important roles played by the sales managers and sales engineers during the sales phase and the support function performed by the project unit (Turkulainen, V. et al., 2013). Furthermore, that project and sales units are involved in defining important project sales information such as offering price, formulating the product technical details and formulating the project needs (Nemethy, 2011; Aamer, 2015; Ståhle et al., 2019; Siegel, 2019; Zwikael & Smyrk, 2019). Although the findings reveal that no information is exchanged between the sourcing unit

and the sales unit, however, it was also identified that the sales unit can share information with the sourcing unit to help improve the activities and performance of the sourcing unit.

How to achieve the right level of collaboration is not an easy task and it can sometimes be accompanied with conflicts between the stakeholders (Vaaland, 2004). As studies have shown that collaboration is integral in project environments (e.g. Long, J. C. et al., 2016; Vaaland, 2004). However, cross-functional integration must overcome internal barriers to information sharing that may exist in the firm (Momeni & Martinsuo, 2019). During the analysis, four areas of concern were identified: no sales information shared with sourcing unit, technical capabilities of the sales unit to review the RfQ documents, RfQ document review by sales support units, and managing project information. Therefore, finding creative ways to limiting the barriers that hinder collaboration efforts between the units is necessary to achieve the benefits accompanied with information sharing. For this reason, the following recommendations:

Recommendation 1. *The sales unit should provide the sourcing unit periodic sales forecast information. For example, the sales forecast information of critical components.*

The second research question focuses on the information generated during the sales phase to share with other units, as the sales phase is obviously the focus of this research. The findings of this research show evidence of a lack of collaboration between the sales and sourcing unit. However, a lot of useful information is generated during the sales phase that can be shared with the sourcing unit. So, rather than focusing on single project information to be shared with the sourcing unit, periodical sales forecast information should be shared with the sourcing unit.

When the sourcing unit engages in early intervention and communication with material suppliers, they have more time to source of material for the firm (Sollish and Semanik, 2010), which means that there is a chance to negotiate better pricing and save money for the firm and the possibility of sourcing for good quality materials. However, the project delivery time and size vary for the different projects. That is, for example, if project "A" may require a certain quantity of components to be delivered to the customer, project "B" might require twice the quantity of components to be delivered for project "A", and the project delivery time may be too short for proper planning for the sourcing unit. Therefore, sharing this inconsistent component requirement per project with the sourcing unit may not provide the sourcing unit the time needed to adequately source for materials to fulfill project needs. As for the sourcing unit, having accurate information from the sales unit is essential for the sourcing unit to establish and build long-term relationships with the suppliers (Chiang, C.-Y. et al., 2012). Therefore, by sharing this type of information, the sourcing unit can engage in continuous evaluation of its suppliers and process (Payne and Dorn, 2012) to ensure on-time project deliveries and better material purchase prices for the project firm.

Recommendation 2. *To improve the sales unit's technical capabilities, the firm should provide systems and product trainings (also refresher trainings), technical meetings with the project units or other support units, and possibly visits during equipment operation and testing.*

Evaluating project technical information received from the customer is one of the tasks performed by the sales unit during the sales phase. Project firms use support from the project unit to define project scope (including technical details) and contract terms (Turkulainen, V. et al., 2013). Nonetheless, the sales unit must possess the knowledge required to evaluate RfQ documents and present the appropriate solutions to the customer. The lack of technical knowledge may lead to the sales personnel not being able to ask the right questions or share the right information with the project unit or the required unit from where support is needed.

In order to find out what information is generated during the sales phase, the sales unit requires the project firm's system technical knowhow to fulfil the customers' requirements and to know what to extract as the right information from the RfQ documents and to ask the right questions. Integrating the sales phase accrued knowledge is important the project success. Savolainen and Ahonen (2015) identified technical knowledge as one of the types of project-based knowledge required by project supplier firms. The knowledge is particularly important during the sales phase to acquire and formulate the project-based information required for the project (Savolainen and Ahonen, 2015). Therefore, it is expected that the sales personnel – even though assisted by the project unit and other support units – must possess the technical skills necessary to accrue the project information needed. The benefits accompanied with this is an improvement in the technical capability of the sales unit's personnel. Also, the assessment of the RfQ documents by the sales unit will improve, and personnel are better alert to spot deviations from the project firm's standards. Furthermore, this will also improve information sharing and exchange between personnel of the sales unit and other units.

Recommendation 3. *Update the project information collection tool to allow for more visibility of the diverse project information collected during the sales phase*.

The information gathered during the project is useful to the project execution process if it is stored properly and if it can be accessed with ease. With today's technological advancements, firms can easily store and share information electronically (Ryynänen et al., 2013). In addition, to make better business decisions, emphasis on quality than quantity of information is necessary (Pierce, E. M. et al., 2014; Bawden and Robinson 2009). Therefore, it is disadvantageous to the project firm when a lot of information is collected whilst almost all the information is irrelevant to the project.

The supplier-project firm offers solutions which requires the use of standard materials designated by the firm. When the solutions offered to some customers requires materials which deviate from the standard usually offered by the project firm, such customer requirement will be regarded as a non-standard offering. The information for such requirement by a customer is collected during the sales phase of the project and stored using

the firm's IT tool. Therefore, to improve the findings related to the first research question (described above), the researcher suggests that the tools for collecting information during the sales phase be improved in order to improve how information is shared between the sales unit and other units.

6. CONCLUSION

6.1 Contribution

This research demonstrated in practice how units in supplier project firm collaborate. This gives an insight to the roles and responsibilities of the sales, sourcing and project unit, and also suggests solutions to enhance collaboration efforts within the supplier project-based firm. However, navigating the benign terrain was a difficult task, it required gathering and bingeing through a plethora of information over the short time available. Nevertheless, the research revealed some findings which are related to the existing theoretical knowledge. The supplier based-project firm project lifecycle can be complex. In project-based supply firms, it is important that internal collaboration between units within the firm exists to ensure the ease of information sharing, project execution and in general successful project delivery. For the supplier based-project firm, the sales phase (Ryynänen et al., 2013; Artto et al., 2011) is a critical phase of the project lifecycle. During this phase a lot of information acquisition is done as the firm's sales unit communicate and interacts with the customers to provide solutions. Likewise, ongoing is the internal collaboration within the project firm to provide the right solutions to the customer.

Although the daily support provided in project firms (Momeni & Martinsuo, 2019) is crucial to project success, the research findings revealed that during the sales process, collaboration mainly exists between the sales and the projects units. This is also mainly because in many cases, the project unit also takes the responsibility of providing technical assistance to the sales units given that the project unit possess a wealth of project experience to provide solutions to technical questions. This finding supports the literature findings, for example Turkulainen, V. et al. (2013) and Ryynänen et al. (2013). On the other hand, despite the sourcing unit also plays a critical role in a supplier based-project firm by ensuring the availability of the materials needed for production and securing good and lasting relationships with suppliers (Sollish and Semanik, 2010), an important role which is critical to a successful project delivery. The research findings showed that there was no collaboration between the sales unit and sourcing unit nor the project unit and sourcing unit during the sale process. Furthermore, in the case company, the type of information exchange that occurs between the sourcing unit and project unit can be described as indirect. However, collaboration between the units early in the project lifecycle can be important for a successful project delivery.

Another finding is related to the information that can be shared with the sourcing unit. The finding of this research shows that some information received during the sales phase can be useful for planning and decision making for the sourcing unit. For a supplier based-project management firm that manufactures its equipment, on-time delivery of the project equipment is important. Therefore, the sourcing unit require forecast sales infor-

mation to help plan long-term material supply and to establish and ensure long-term relationships with suppliers (Chiang, C.-Y. et al., 2012). Basically, the project firm should support the availability of information that helps the sourcing unit. Also, sharing such information with the sourcing unit also means making such information readily available to be shared. Therefore, rather than focusing on providing the sourcing unit with information based on individual projects, the findings of this research suggest that due to the complexity of the sourcing process and most importantly the supplier selection process (Sollish and Semanik, 2010), future sales plan information should be shared with the sourcing unit.

6.2　Managerial implications

This research shed some more light on how project-specific information is generated during the sales phase of the supplier based-project management firm. The findings of the research also highlight the units that provide support to the sales unit during the sales phase. The analysis of the data collected during the research shows that project information is diverse and suggests that the information can be very beneficial to the project firm. Therefore, the findings of this research suggest two implications to managers.

First, support received by the sales unit during the sales phase does not have to be limited to the technical support offered by the project unit. The findings of this research suggest that supplier based-project firms should maximize the use of its diverse capabilities and skills across the different units of its organization. In other words, the firm should seek efficient ways to put its structure, infrastructure, people, knowledge, and information into use (Momeni & Martinsuo, 2019). In accordance with the literature, the research shows that the project-specific information gathered during the sales phase is very important throughout the project lifecycle, in addition, asking the right questions to acquire the necessary information is equally important. Therefore, the individuals involved in proposing the solutions to the customer should possess the adequate knowledge to know the right questions to ask. As a result, the complexity of the project emphasizes the need for collaboration between the sales and other units during the sales phase.

Second, is regarding sharing of sales acquired and generated information with other units. The aim of the research is to enhance collaboration between sales unit, project, and sourcing unit. However, the findings of the research show that based on business practices and processes of the case firm, collaboration between the units can be improved by sharing more information. Especially, between the sales and sourcing unit, where seldom does information exchange between both units happen. The research suggestions may not necessarily mean the best or main approach to improving collaboration, however, it proposes an alternative and improved way for supplier based-project firms to manage their solutions selling and project delivery to their customers. Fundamentally, the findings of this research suggest the use of multifaceted approaches that considers the different units' responsibilities, activities and needs, to improve inter-departmental collaboration, solution selling and project delivery.

6.3 Limitations and recommendations for further research

The qualitative research carried out in this case study was not without some limitations. These limitations must be acknowledged and discussed. The first limitation is that the findings of this research is based on data collected and analyzed from one case company. The researcher collected data from units of the case company, also, how the data was collected and analyzed was described. However, due to the limited amount of data to analyze as a result of availability of case companies to consider, the findings of this research cannot be generalized to apply to all other supplier based-project firms. Nonetheless, readers are still able to read and understand the process of how this case was conducted and find situations where this research may be applicable. In the future, further research of more supplier based-project management firms in relation to inter-departmental information exchange between units during the sales phase will increase the chance to collect more data and generalize the results of the data analysis.

Second, due to time constraint, only one sales case was analyzed to understand how the units collaborate. However, the cost impact of collaboration was not considered during this research. Therefore, it is recommended that future research on collaboration can investigate the cost impact of collaboration during the sales phase of the project lifecycle while considering multiple cases. Also, the overall cost impact throughout the project lifecycle as a result of effective or ineffective collaboration during the sales phase by using multiple case example. Finally, this research clearly focused on the new build (or new project) process, and not the aftersales business. Therefore, the data and analysis focused on the new build business of the organization, although, there also exist the aftersales business in the firm. Hence, a suggestion of future research is to focus on how different units collaborate during the selling process of the aftersales business.

In general, the researcher hopes that this research has provided a new perspective and value to the vast and rich literature of project management, particularly from a supplier based-project firm perspective.

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APPENDIX

<u>SALES UNIT QUESTIONS</u>

- Do you share information with the project and/or sourcing departments during the New Build project sales phase?

- What are the main responsibilities and objectives of the sales unit during the sales phase of New Build projects? How does the sales unit objectives support activities of the project department and sourcing department?

- What is/are the critical information needed to be collected during the sales phase? Please give examples of the critical data and information. How does the critical information support the activities of the project department and sourcing department during the project lifecycle?

- When critical project sales-related information acquired during the sales phase is collected and stored, in your opinion, is the information:

  1. Usually stored in the right format (and ready to be used when extracted it)?
  2. Accessible and easy to understand when collected?
  3. Usually accurate and UpToDate?
  4. Usually, complete?

- What tool(s) is/are used to store and share the sales information with the other units?

- Does the critical information collected during the sales phase of a standard project differ from the critical information collected during the sales phase of special project?

- From your view, are there deficiencies in the current information sharing and exchanging methods between the sales department and sourcing and/or projects department.

PROJECT UNIT QUESTIONS

- What are the main responsibilities and objectives of the project unit regarding New Build projects?

- How does the project unit collaborate with the sales unit and the sourcing unit?

- How does the project department typically exchange data and information with the sourcing department during each New Build's project lifecycle?

- What is/are the critical data and information needed to be collected during the sales phase to support the objectives and activities of the project department? Please give specific examples of the critical data and information.

- Where and how do you access sales information acquired during the sales phase of the New Build projects required by your department? Is there a standard/preferred tool used?

<u>SOURCING UNIT QUESTIONS</u>

- What are the main responsibilities and objectives of the sourcing department?

- Does the sourcing department exchange information with the sales and/or project departments during the lifecycle of a New Build project, and most importantly during the sales phase?

- What is/are the critical information needed to be collected during the sales phase to support the objectives and activities of the sourcing department?

- How does the sourcing unit collaborate with the project unit during the project lifecycle?

- Where and how do you access the critical project-related information you require for the New Build projects? Is there a standard/preferred tool for information exchange?