2017

Strategies to Reduce Cost Overruns and Schedule Delays in Construction Projects

Ali Al-Keim
Walden University

Walden University

College of Management and Technology

This is to certify that the doctoral study by

Ali Al-keim

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Patsy Kasen, Committee Chairperson, Doctor of Business Administration Faculty

Dr. James Glenn, Committee Member, Doctor of Business Administration Faculty

Dr. Scott Burrus, University Reviewer, Doctor of Business Administration Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2017

Abstract

Strategies to Reduce Cost Overruns and Schedule Delays in Construction Projects

by

Ali Al-keim

MPM, University of Technology, Sydney, 2007

MCPM, University of New South Wales, 2005

BS, Almustansiriyah University, Iraq 1995

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

December 2017

Abstract

Senior managers fail to control time and costs of construction projects despite available advanced project management tools. Based on project management theory, the objective of this multiple case study was to explore the strategies senior managers use to reduce cost overruns and schedule delays in construction projects. Primary data were obtained from semistructured interviews with 3 senior managers from different construction project management companies who have successfully managed construction projects in Qatar. Data analysis process included a modified Van Kaam method. The transcribed interviews were interpreted and coded to generate themes and were validated through member checking and archival documents. The most centralized themes included (a) master planning, (b) processes and procedures, (c) managing design stage, (d) procurement management, (e) use of proper software, (f) setting project cost and time, and (g) deciding clear scope. A construction project may not succeed without appropriate planning for all stages of the project lifecycle. Managing the approval of the project components during the design stage contributes to reducing changes during construction, which is helpful to control cost and time. The project processes and procedures are meaningful roadmaps for the managers and decision makers. The implications for positive social change include the potential to maintain a cleaner Earth by reducing design and construction wastes. Reducing wastes improves the cost of construction and provides opportunities for people to own property at more affordable costs.

Strategies to Reduce Cost Overruns and Schedule Delays in Construction Projects

by

Ali Al-keim

MPM, University of Technology, Sydney 2007

MCPM, University of New South Wales 2005

BS, Almustansiriyah University, Iraq 1995

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

December 2017

Dedication

I thank God first for giving me the power to complete this DBA journey. I dedicate this doctoral study to my father who dreamed of seeing me completing this degree. I also dedicate this research to my wife, Zainab. My wife supported me by providing the best atmosphere for completing this study of which without her support, this study would not be completed. Many thanks for my father and for Zainab.

Acknowledgments

I thank the Walden community for the support provided while in this DBA journey. My special thank you is for my chair, Dr. Patsy Kasen who provided me with extraordinary support and guidance whenever needed. I also thank Dr. James Glenn as part of my committee for his valuable contributions and all classmates for exchanging their knowledge and experience. Others that enhanced my ability to complete this research are other members of my committee, academic advisors, and librarians.

Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study

Gulf Cooperation Council (GCC) is an intergovernmental organization consisting of Arabian Gulf countries (AGR) including United Arab Emirates (UAE), Kingdom of Saudi Arabia, Qatar, Bahrain, Kuwait, and Oman, formed because all AGR countries have similar socioeconomic and political traits (Al-Sabah, Menassa, & Hanna, 2014; Jaeger & Adair, 2013; Ruqaishi & Bashir, 2015). The economic growth in the GCC countries depends on the success of the construction industry, similar to other countries around the world (Al-Sabah et al., 2014; Jaeger & Adair, 2013; Jarkas & Haupt, 2015; Jarkas, Radosavljevic, & Wuyi, 2014; Jarkas & Younes, 2014). Monitoring and control are an important success factors for managing construction projects, which have a positive effect on project performance and profitability (Ahiaga-Dagbui & Smith, 2014; Montes-Guerra, Gimena, Perez-Ezcurdia, & Diez-Silva, 2014; Olawale & Sun, 2015). Senior managers fail to control time and cost of construction projects despite the advanced available project management (PM) processes, tools, and systems (AlSehaimi, Koskela, & Tzortzopoulos, 2013; Jarkas & Younes, 2014; Mir & Pinnington, 2014). Cost overruns and project delays have a severe effect on the economy of GCC countries (Ruqaishi & Bashir, 2015). The objective of this qualitative multiple case study was to explore what strategies senior managers use to reduce cost overruns and schedule delays in construction projects. This research contributes to providing lessons to senior managers in GCC countries to reduce cost overruns and schedule delays in construction projects, which can enhance the economy of GCC.

Background of the Problem

The construction industry exerts significant influence on economic growth and development of many countries (Oko John & Itodo, 2013). The economic growth of Qatar depends on the success of the construction industry, which is similar to the situation in all AGR, Ghana, Malaysia, and Singapore (Al-Sabah et al., 2014; Jaeger & Adair, 2013; Jarkas & Younes, 2014). The main stakeholders in most construction firms are clients (developers), designers, supervision teams, and contractors (Osei, 2013). The client may assign a PM consultant to manage the project and act as an owner representative (Osei, 2013), but in any case, construction project monitoring and control is a critical success factor for construction projects (Olawale & Sun, 2015). Often, senior managers fail to control time and cost of construction projects despite the advanced available PM processes, tools, and systems (Mir & Pinnington, 2014). Cost overruns and project delays have a severe effect on the economy of GCC countries (Ruqaishi & Bashir, 2015). Researchers and practitioners have tried to improve the performance of construction projects but could not find a standard solution (Spalek, 2014).

Researchers found that over 59% of development projects experienced client related rework (CRR), which increased the project cost by over 7% and caused over 3 weeks of delays (Hwang, Zhao, & Goh, 2014). The most critical risks to the construction projects are related to the clients (Jarkas & Haupt, 2015). Few researchers have explored the problem of cost overruns and schedule delays in the construction industry in the State of Qatar. I will attempt to fill this gap in the research by exploring what senior managers can do in the State of Qatar to reduce cost overruns and schedule delays.

Problem Statement

In 2014, more than 80% of property development businesses in Singapore experienced CRR, and more than 59% of cost overruns in construction projects were because of CRR (Hwang et al., 2014). CRR caused delays that on average exceeded 3 weeks and increased project planned costs by more than 7% (Hwang et al., 2014). Every month of delay to complete any construction project results in income loss to the contractor of approximately 5.5% (Ballesteros-Perez, del Campo-Hitschfeld, & Gonzalez-Cruz, 2015). The general business problem is the inability of senior managers in the property development business to control cost overruns and schedule delays, leading to negative effects on business and life. The specific business problem is that some senior managers lack strategies to reduce cost overruns and schedule delays.

Purpose Statement

The purpose of this qualitative multiple case study was to explore the strategies construction senior managers use to reduce cost overruns and schedule delays. The targeted population consisted of senior managers from three different construction PM companies who succeeded in reducing cost overruns and schedule delays in Qatar. Managers could improve the cost of living for residents of Qatar through reducing waste, which has a positive effect on social change (Senge, Smith, Kruschwitz, Laur, & Schley, 2008). Applying strategies to avoid overruns caused by rework (waste) reduces the environmental impacts and contributes to maintaining a clean Earth (Kozlovska & Spisakova, 2013).

Nature of the Study

Three methods for conducting research are qualitative, quantitative, and the mixed method. A researcher uses the qualitative method to gain valid and reliable knowledge of a phenomenon to achieve deep and new insights into the context of that phenomenon, where statistical analysis is not enough to obtain such insightful findings (Berger, 2015; Hammer, 2011; Narag & Maxwell, 2014; O'Reilly & Parker, 2013; Wolgemuth et al., 2015; Yilmaz, 2013). Quantitative research includes statistical data of causal relationships, correlations, and comparisons with findings of no deep insight into the studied area because a researcher develops the information through numeric data and from participants responding to close-ended questions (Barnham, 2015; Doloi, 2013; Frels & Onwuegbuzie, 2013; McCusker & Gunaydin, 2015; Yilmaz, 2013). The quantitative method is not suitable for a study in which a participant needs to answer open-ended questions to explore the phenomenon with insightful details (Bernard, 2013). Researchers use the mixed method to conduct comprehensive studies with both qualitative and quantitative approaches to gain more integrated and detailed information through exploring the phenomenon and testing hypotheses of the qualitative findings (Dogbegah, Omoteso, & Owusu-Manu, 2013; Guetterman, Fetters, & Creswell, 2015; Maxwell, 2016; Ramlo, 2016). The mixed method is more time-consuming than qualitative and quantitative research methods. Mixed method was not appropriate for this study.

Qualitative research designs include phenomenology, ethnography, grounded theory, narrative research, and case study (Yin, 2014). Researchers use phenomenological

design for in-depth exploration of the lived experiences of participants (Davidson, 2013). Phenomenological design was not appropriate for my research because my intention was to explore strategies and not to describe the lived experiences of individuals. Ethnography is often an expensive, extensive, and prolonged process that researchers use to investigate a cultural phenomenon of individuals or ethnic groups (Bernard, 2013). Ethnography research was not appropriate because I did not need to observe individuals' or group behaviors. Researchers use grounded theory to generate a new theory (Bryce, 2013). Grounded theory was not suitable for my study because I did not seek to generate a theory. Narrative design is useful to investigate human action through story description of the lived experiences of participants, which can be accomplished through interviews, photographs, or other documents (Marshall & Rossman, 2016; Polkinghorne, 2013). Researchers use narrative design to investigate the *what, when, who,* and *how* of human experience via exploring life stories through unpredicted interactions with the participants (Green, 2013; Yin, 2014). However, the unpredicted interaction could affect the trust between the participants and the researcher, which can reduce the quality and reliability of the narrative research (Loh, 2013; Suarez-Ortega, 2013). I did not use narrative design because I wanted to maintain the trust with the participants and enhance the quality and reliability of the study. Researchers use case study designs to investigate phenomena, over which the investigator has no control (Marshall & Rossman, 2016; Singh, 2014; Yin, 2014).

Research Question

RQ: What strategies do senior managers use to reduce construction cost overruns and schedule delays in Qatar?

Interview Questions

1. What is your experience of construction projects that involved successful managers who reduced cost overruns and schedule delays?
2. What are the lessons learned from previous projects that experienced cost overruns and schedule delays?
3. What strategies do you use to reduce cost overruns and schedule delays?
4. What difficulties did you face when developing and implementing these strategies?
5. How did you address the difficulties?
6. What are the benefits of using management software to reduce cost overruns and schedule delays?
7. What other relevant project management strategies and information would you like to share or recommend to reduce cost overruns and scheduling delays?

Conceptual Framework

The conceptual framework for this study was the PM theory. PM theory is a collection of demonstrated efficacious practices for managing projects (Engwall, 1998). In the early 1900s, Fayol was the first to introduce managerial thinking concept based on his experience (Garel, 2013). Fayol highlighted in 1916 that the main function of

management started as planning, organizing, staffing, and controlling (as cited in Northouse, 2013). Gaddis (1959) highlighted that an important goal is to complete the project within the allocated time and budget. Gaddis is the oldest article with explicit reference to PM and the role of project manager (Garel, 2013).

Practitioners developed and implemented a PM concept based on their individual practice and experience in the 1950s and 1960s, which contributed to its standardization as a theory since the 1960s (Engwall, 1998; Garel, 2013). The Project Management Institute (PMI) defined PM activities in the 1960s by analyzing management practices of successful projects (Garel, 2013). PMI developed and distributed the *Project Management Body of Knowledge* (PMBOK), which included several management areas (PMI, 2013). The PMBOK includes areas related to project cost management and project time management, which offer potentially useful principles for project managers to apply for reducing cost overruns and schedule delays (PMI, 2013).

Operational Definitions

The following definitions provide a common understanding of terms used in this study. Definitions are important to avoid misinterpretation or ambiguity (Dolnicar, 2013).

Building information modeling (BIM): BIM is an open data tool that designers and PM consultants use to minimize errors and underestimations (Elmualim & Gilder, 2014).

Client related rework (CRR): CRR is the rework caused because of the client demand to change the design or physical work (Hwang et al., 2014; Laufer, 2012).

Gulf Cooperation Council (GCC): GCC is an intergovernmental organizaation consisting of AGR countries including UAE, Kingdom of Saudi Arabia, Qatar, Bahrain, Kuwait, and Oman formed because all AGR countries share similarities in economic, social, and political structures (Al-Sabah et al., 2014; Jaeger & Adair, 2013; Jarkas et al., 2014; Ruqaishi & Bashir, 2015).

Project Management Body of Knowledge (PMBOK): PMBOK is a guide that the PMI introduced as a global standard for project managers to conduct good management practices while managing individual projects (PMI, 2013).

Project management office: Project Management Office (PMO) is the office responsible for providing the support for enhancing timely completion of the projects within the allocated budget (Kaleshovska, 2014). PMO enhances achieving the strategic alignment between the initiated projects and corporate strategy (Kaleshovska, 2014). Researchers call it project support office on some occasions (Mariusz, 2014).

Tender: Tender in construction is the stage of the project lifecycle where the design documents are complete and ready for contractors to price the project (Jarkas & Younes, 2014; Memon & Abdul Rahman, 2014; Rosenfeld, 2014; Syed Jamaluddin, Mohammad, & Ahmad, 2014; Williams & Gong, 2014; Uher & Loosemore, 2004).

Work breakdown structure: Work breakdown structure is a term that project managers and other practitioners use to breakdown the activities and divide the project deliverables into more manageable elements and levels (PMI, 2013; Uher & Loosemore, 2004).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions are facts a researcher considers true but are beyond the control of the researcher within the study (Leedy & Ormrod, 2013). The first assumption was that I would receive true and reliable responses of participants based on confirming to the participants that all responses would be confidential. I provided a consent form for participants that ensured confidentiality of the provided information. My second assumption was that inviting participation from PM consultants was most suitable to obtain unbiased information because the business of PM consultants in construction is about managing the construction projects in a professional way.

Limitations

Limitations in a doctoral study are research weaknesses beyond the control of the researcher (Leedy & Ormrod, 2013; Paechter, 2013; Shipman, 2014; Yin, 2014). Limitations affect the power of the study and the decision of audiences who intend to use the research for practical and academic purposes (Kirkwood & Price, 2013; Shipman, 2014). Sample size can be a limitation to a study (Henry, 2013; Yilmaz, 2013). That there were only three participants in this case study was a limitation. Another limitation was the results of the qualitative study needed to be unbiased, which depended on the accuracy of information that participants provided while exploring their experience. Qualitative research bias is a threat to the study validity (Maxwell, 2013).

Delimitations

Delimitations are restricting boundaries that a researcher put in the study (Perry, 2012). This study included participants from Qatar only. The population consisted of three project managers at a senior level from three different PM consultancies without considering participants from clients, design and supervision consultants, and contractors. To meet the time constraint of the study, I involved only three participants with access to three projects that included records in which each of the senior managers reduced cost overruns and schedule delays. The delimitations have an effect on generalizing the study findings (Silverman, 2013).

Significance of the Study

Contribution to Business Practice

I explored the strategies senior managers use to reduce cost overruns and schedule delays in construction projects. The senior managers dealing with construction projects could use the results of my study for reducing cost overruns and schedule delays to improve the performance of future projects, construct profitable projects, and attract new customers for business growth and sustainability. Change orders add costs to projects, which have a negative effect on the total cost of building construction. Senior managers could use the findings to improve future results by avoiding similar problems (Gao, Ergan, Akinci, & Garrett, 2014; Jallow, Demian, Baldwin, & Anumba, 2014). Senior managers can also adopt monitoring and controlling techniques for improving project success (Montes-Guerra et al., 2014). Understanding and applying sustainability strategy has positive effects on productivity in the construction process (Kenley, 2014). Senior

managers could also benefit from the findings by learning mechanisms for early risk detection, which aids problem prevention and the problem-solving process, and favorably impacting the project performance (Meng, 2014). Exploring and developing a shared vision and strategy could improve results regarding time and efficiency and positively affect business sustainability (Senge et al., 2008).

Implications for Social Change

Senior managers must understand and apply a sustainability strategy for the short and long-term in an effort to provide and maintain a clean Earth (Senge et al., 2008). Managers in construction could use the results from my study to recognize how rework results in waste generation that has a negative effect on the environment. The findings, conclusions, and recommendations of this study provided information to reduce costs to customers and attenuating environmental impacts to improve the quality of living (Kozlovska & Spisakova, 2013).

A Review of the Professional and Academic Literature

The objective of this literature review was to explore literature written about what strategies senior managers use to solve the existing problem of cost overruns and schedule delays in construction projects, which is a chronic global problem that is increasing (Alinaitwe, Apolot, & Tindiwensi, 2013). This literature review provided a detailed history of cost overruns and schedule delays in construction, with critical insight into this problem attained by focusing on the PM theory as a base and benchmark for conducting the review. The databases used for this study were from Walden University Library and included Business Sources Complete, ScienceDirect, SAGE Premier,

Emerald Management Journals, EBSCOhost, and Google Scholar. The primary search keywords were *cost overrun*, *schedule delays*, *construction*, *project management*, *project management theory*, and *GCC*. I selected these keywords to obtain results related to the research question and its link to the specific business problem and conceptual framework. The data searched contained a mix of 31 books, 12 dissertations, and 435 peer-reviewed articles. I examined and filtered to only 20 books, 4 dissertations, and 222 articles. The filtration I made was to focus on specific relevant resources and to meet Walden University requirements. Walden University requirements include ensuring 85% of the total sources to be peer-reviewed with a minimum of 60 peer-reviewed sources in the literature review, as well as ensuring that 85% of the total sources have a publication date less than five years from the anticipated completion date that is 2017. I included 212 peer-reviewed sources that form 94% of the total sources. Ninety percent of the total sources have a publication date less than five years from the anticipated completion year that is 2017.

Project Management Theory

PM theory is a collection of demonstrated efficacious practices for managing projects (Engwall, 1998; Northouse, 2013). PM is useful for managing projects with chaotic organizations (Engwall, 1998; Northouse, 2013). Fayol (as cited in Northouse, 2013) highlighted in 1916 that the main function of management started as planning, organizing, staffing, and controlling. Fayol (1916) was the first in introducing managerial thinking concept based on his experience (Garel, 2013). Researchers and practitioners started further developing the PM as a theory since the1960s (Engwall, 1998). PM

became a model in the 1950s and 1960s when *Harvard Business Review* included the first explicit reference to PM in 1959; however, the standardization of PM tools and practices started only in the 1980s (Garel, 2013). Since the 1960s, practitioners further developed the PM concept based on their individual practice and experience to standardization as a theory (Engwall, 1998; Garel, 2013).

Chen and Partington (2006) presented the PM competency in the United Kingdom in three hierarchical levels. The first level was for the planning and control tasks. The second level was organizing the project activities, including coordinating stages and interfaces of the project. The third level was examining and managing problems. Chen and Partington argued that the third level managers are the most competent whereas first level managers have the least competency among the three discussed levels in construction PM. Chen and Partington considered the standards used to assess and develop PM competence as the point of departure for the knowledge areas presented as competencies. Chen and Partington highlighted the need to train those managers who lacked attributes for any of the three hierarchical levels to achieve effective PM competence. PMI defined PM activities in the 1960s by analyzing management practices of successful projects (Garel, 2013). PMI developed and distributed the PMBOK, which included information in several management areas (PMI, 2013).

The PMI introduced a guide to the PMBOK with which project managers can apply the process groups to help reduce cost overruns and schedule delays (PMI, 2013). The five groups of the PM process include (a) initiation process group, (b) planning process group, (c) executing process group, (d) monitoring and controlling process group,

and (e) closing process group (PMI, 2013; Wysocki, 2014). The five process groups have one or more of the 10 knowledge areas as introduced in a matrix illustrated in Figure 1 on which PMI elaborated in Table 3.1 of the PMBOK (5th ed.; PMI, 2013). PMI provided a permission to use the figure caption (Appendix D).

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

Figure 1. PM process group and knowledge area mapping. Reprinted from *Project Management Body of Knowledge* (PMBOK®; 5th ed.; p. 61) by Project Management Institute, 2013, Newtown, PA: Author. Copyright [2013] Project Management Institute. Reprinted with permission.

The 10 knowledge areas that PMI introduced in the PMBOK are (a) project integration management, (b) project scope management, (c) project time management, (d) project cost management, (e) project quality management, (f) project human resources management, (g) project communication management, (h) project risk management, (i) project procurement management, and (j) project stakeholder management. Each of the 10 knowledge areas includes certain processes within the area. The following subsections include an overview of the 10 knowledge areas of the PM process groups as demonstrated in the PMBOK (PMI, 2013).

Project integration management. The project integration management exists in the five process groups. The project manager starts the integration management in the initiating process group. The managers in this phase develop the project charter as the output for next process. The managers develop a project management plan (PMP) in the planning process group by using the identified project charter and other outputs from other processes, where the output in this phase is the PM plan. The project managers (a) direct and manage project work in the execution phase, (b) monitor and control project work, and (c) perform integrated change control in the monitoring and controlling process group. The project managers provide update on the PM plan and update the

change requests log. The project managers *close project or phase* in the closing process of the project lifecycle.

Project scope management. Practitioners starts the scope management by conducting four tasks in the planning process group: (a) plan scope management, (b) collect requirements, (c) define scope, and (d) create work breakdown structure. In these four tasks, the managers create a scope management plan of how to define the project scope, collect and document the stakeholder requirements, define the scope and related description, and divide the project deliverables into more manageable elements and levels. Project Scope Management appears again in the monitoring and controlling process group where the managers *validate scope* and *control scope*. In this phase, the manager creates an official document of scope acceptance and monitor the scope status to control related changes.

Project time management. The knowledge areas of project time management appear in the planning process group and in the monitoring and controlling process group. Project time management includes seven tasks required to manage the completion of projects within the planned date for completion. The first six tasks that appear in the planning process group are *plan schedule management, define activities, sequence activities, estimate activity resources, estimate activity durations,* and *develop schedule*. The project manager executes the task of *control schedule* in the monitoring and controlling process group. In the planning phase, the project manager sets the project policies and procedures for the project schedule, identifies actions to achieve deliverables, establishes the relationship among activities and the required resources, and

develops the project program. In the monitoring and controlling phase, the project manager monitors and updates the project schedule and takes action to reschedule the activities to achieve the project plan.

Project cost management. The knowledge areas of project cost management include four processes required to manage the cost and reduce overruns. The four processes are *plan cost management, estimate costs, determine budget*, and *control costs*. The planning process group includes the first three processes of project cost management, whereas the monitoring and controlling phase includes the *controlling costs*. In the planning phase, the project manager sets the project process and procedures for planning and controlling the project cost, estimates resources cost, and plans for the budget to fund the project. The project manager monitors and updates the project budget, and continuously manages changes to the projected cost.

Project quality management. Project quality management includes three tasks: *plan quality management, perform quality assurance*, and *control quality*, which appear in three process groups that are planning, executing, and monitoring and controlling. The manager identifies the project quality requirements and compliance indicators in the planning process group, ensures the use of quality standards in the executing phase, and monitoring and assessing performance during the monitoring and controlling stage.

Project human resource management. *Plan human resource management* is the first task that exists in the planning process group where the manager identifies the human resources requirements in term of roles and responsibilities, the required human skills, reporting links. Three tasks required in the execution phase of the project lifecycle

are *acquire project team*, *develop project team*, and *manage project team*. In the execution phase, the project manager secures the required human resources, develops competencies and interaction, enhances the organizational atmosphere, and manages human performance for improvement.

Project communication management. Similar to project quality management, the three tasks of project communication management exist in the planning process group, the execution phase, and the monitoring and controlling stage. The three tasks of this management area include *plan communication management*, *manage communications*, and *control communications*. In the planning group, a manager develops a project communication plan and protocols among the stakeholders, manages the information and communication plan in the execution phase, and monitors and controls the communication in the planning and controlling process to ensure communicating the information required for the stakeholders.

Project risk management. This management area includes five sub-processes in the planning process group and one in the monitoring and controlling. The five sub-processes are *plan risk management*, *identify risks*, *perform qualitative risk analysis*, *perform quantitative risk analysis*, and *plan risk responses*. *Control risks* is the task that the manager accomplishes in the monitoring and controlling process group by implementing risk monitoring and responses plan, and assessing its effectiveness. In the planning process group, the manager defines the steps for conducting risk management plan, identifies the critical risks, prioritizes them qualitatively based on occurrence

probability and level of impact, quantifies the effect on the project, and develops actions to create opportunities to achieve the objectives.

Project procurement management. Project procurement management includes *plan procurement management* in the planning group, *conduct procurements* in the executing process, *control procurements* in the planning and controlling, and *close procurements* in the closeout phase. In this management area, the manager collects the procurement requirements and decisions, finds alternative traders, decides the seller and formalizes the agreement, manages relationships and controls the agreements to implement the required changes in the procurement process, and closes the procurement phase as the last task of this management area.

Project stakeholder management. This management area includes four tasks required in the initiating, planning, executing, and monitoring and controlling process groups. These tasks are *identifying stakeholders*, *planning stakeholder management*, *managing stakeholder engagement*, and *controlling stakeholder engagement*. In this management area, the manager identifies stakeholders with high influence on the project outcomes, develops strategies to engage them along all phases of the project lifecycle, maintains communication and meets expectations, and monitors relationships to apply adjustments when needed.

PM practitioners practice more than one knowledge area for managing projects, which may need the project manager to interact and interface with the 10 knowledge areas across the process group, starting from the start of the project until closeout (PMI, 2013). Many leaders use the PM techniques as a practice for improving the chances for

success in the execution of project works, innovation, and any changes required in the organization (Kaleshovska, 2014). PM practice is not enough by itself to improve project outcomes because the project success in term of project time and cost needs proper control systems in place as well (Ling & Ang, 2013). Despite the available PM knowledge areas, there is a lack of success to reduce cost overruns and schedule delays (Montes-Guerra et al., 2014). The senior managers do not attend the essential training needed to exercise the monitoring and controlling techniques (Montes-Guerra et al., 2014). This lack in training has a negative effect while practicing the PM techniques (Montes-Guerra et al., 2014).

Overview of History of Cost Overruns and Schedule Delays

The construction industry is a unique, fragmented, dynamic, and complex industry with risk and uncertainty in every project (McCord, McCord, Davis, Haran, & Rodgers, 2015). Cost overruns and schedule delays are common problems in the construction business (Hwang & Yang, 2014; McCord et al., 2015; Polat, Okay, & Eray, 2014). Completing construction projects within the planned time and budget is the main objective of construction project managers (Al Haj & El-Sayegh, 2015). More than 55% of the construction projects in Malaysia have cost overruns in which the type of the project influences the overruns (Shehu, Endut, Akintoye, & Holt, 2014). For example, the public sector has smaller cost overruns than the private enterprises, and almost all very large projects exceed the budget by less than 10% (Shehu et al., 2014).

Some senior managers of property development projects are unable to control project time and cost appropriately (Elmualim & Gilder, 2014). Construction project

managers lack effective coordination and communication among the stakeholders to establish shared project objectives (Elmualim & Gilder, 2014). Earlier studies about schedule delays did not include effective recommendations for senior managers and practitioners because most researchers in similar studies used descriptive and explanatory studies (AlSehaimi et al., 2013). AlSehaimi et al. (2013) selected earlier studies regarding cost overruns and schedule delays and found that 87% included identification to poor planning, 69% for procurement problems, and 56% were for poor site management. The identified problems were the main factors that affected construction projects management (AlSehaimi et al., 2013). AlSehaimi et al. found that 25% of the completed studies did not include recommendations for solutions to reduce schedule delays.

On average, small and medium projects exceeded 3 weeks from the planned date for completion (Hwang et al., 2014). In the same study, Hwang et al. (2014) found on average, 58% of the projects in Singapore were with delays influenced by construction rework that is the most influential factor to schedule delays. Love, Wang, Sing, and Tiong (2013) calculated the cost overruns of 276 infrastructure and transportation construction and engineering projects and revealed an average cost overrun of 12.22 %. Researchers and practitioners tried to increase the efficacy of projects time and cost to improve performance but could not find a common solution to overruns and delays (Alinaitwe et al., 2013; Rosenfeld, 2014; Spalek, 2014). Senior managers need to treat the root causes of overruns and delays rather than treating symptoms that result from the problem (Rosenfeld, 2014).

UK contractors and consultants utilize similar cost and time control practices (Olawale & Sun, 2015). The most common deficiency is that senior managers do not have integration of time and cost during the controlling process (Olawale & Sun, 2015). The resulting cost and time overruns are from this gap that exists in the integrated controlling process of both cost and time (Olawale & Sun, 2015). Arashpour et al. (2014) highlighted that construction rework volume creates a large effect on cost overruns regardless if the source of rework is from the client side (presented as design change once construction has begun) or from the contractor side (resulted from an incorrect interpretation of design documents). Senior Managers need to avoid both design and construction reworks.

Project variation is a global business problem that negatively affects the development cost and completion schedule. The longer the task duration is, the less the effect of variation on productivity because of the balance that may exist between negative and positive variation in that activity (Lindhard, 2014). The stage of enabling work (excavation and earthwork) is the stage exposed to the highest portion of cost overruns because of the unavailability of accurate soil investigation report and conditions (Azman, Abdul-Samad, & Ismail, 2013). The information included in this overview of the history of cost overruns and schedule delays provides evidence that there are several factors affecting the cost and time of any construction project.

Effects of Cost Overrun and Schedule Delays on Business and Life

A project delay causes more risk of inflation and financial charges to clients and contractors, where most of that commercial loss applies to the party responsible for the

delay (Ansar, Flyvbjerg, Budzier, & Lunn, 2014). Schedule delay is a common problem in the construction industry, which affect the project performance and reduces the potential to establish a partnership and business growth (McCord et al., 2015). Project delays create conflict between the two main stakeholders, the client and the contractor, which justifies the need for scheduling control (Yang et al., 2013). Project delay creates time pressure on the project teams, which may influence the adoption of innovation as a positive effect, but may affect team effectiveness when there is high pressure and stress (Wu & Passerini, 2013).

Cost overruns and schedule delays have a severe effect on the economy of GCC countries, regardless of the organization size or ownership (Ruqaishi & Bashir, 2015). Cost overruns and schedule delays cause slow continuity of development businesses in Ghana (Amoatey, Ameyaw, Adaku, & Famiyeh, 2015). Cost overruns and schedule delays reduce the quality of construction projects environment in Malaysia (Syed Jamaluddin et al., 2014). Micro-scaled contractors in Turkey need to avoid cost overruns because those entities had limited capital and exposed to the risk of bankruptcy resulted from potential cost overruns (Polat et al., 2014). Many construction projects in the Arabian Gulf Region suffered cost overruns and project delays, which affected the performance and business relationships among the involved parties (Al-Sabah et al., 2014).

Construction projects create a significant amount of construction waste, which becomes higher when there is construction rework. There are 16 critical measures of Construction Waste Management (CWM) categorized into five components (Yuan,

2013). The five categories are enhancing awareness and behavior of major stakeholders, improving regulations for CWM, controlling site CWM, efficiently using materials on site, and measuring waste recycling design (Yuan, 2013). The most critical measures for CWM are improving regulations for CWM, controlling site CWM, and developing transactional systems to motivate for materials management and saving (Yuan, 2013).

The USA and UAE produce more construction waste than any other countries, which affects the environment (Al-Hajj & Hamani, 2011). This waste equates to more than 200 million tons of wastages every year, particularly during the construction stage of the projects lifecycle (Al-Hajj & Hamani, 2011). Variation orders to perform changes in the work may not directly generate the waste but can affect the start and finish date of subsequent activities, which has a correlation to the manpower wasted while executing the works (Lindhard, 2014).

Leaders of global engineering and construction companies apply sustainability as part of corporate objectives, which influences waste recycling and waste reduction of the building industry around the globe (Yates, 2013). Understanding and applying sustainability strategies have positive effects on productivity improvement in the construction process (Kenley, 2014). Sustainable design is a method used to achieve reducing construction wastages, and the innovative construction technologies are effective strategies to reduce construction wastages (Kozlovska & Spisakova, 2013). Quantifying the construction wastage estimate on different stages of the project lifecycle is essential to decide and implement waste minimization and control programs for operating current and future projects (Kozlovska & Spisakova, 2013). Liu, Osmani,

Demian, and Baldwin (2015) developed a construction waste minimization (CWM) framework to examine the correlation between BIM and CWM during the design phase of construction projects. This waste detection feature allows designers to ultimately create designs with minimal waste because the technology allows for the testing of multiple models before choosing the final design.

Design and Tender Related Factors

Contractors in Qatar consider risks related to the consultants as the second most critical in construction projects (Jarkas & Haupt, 2015). Approximately 73% of construction professionals believe that design management is essential to ensure timely and quality design within the specified budget (Elmualim & Gilder, 2014). The reduction in the total duration and amount of reworks depends on the accuracy of early information that is the primary inputs at the design stage (Hossain & Chua, 2014). The most common reasons for rework and subsequent delays in Singapore are design related changes, and poor design coordination, which lengthens the project duration an average of 25% (Hwang & Yang, 2014). Poor design coordination and unclear tender drawings and specifications are major contributing factors to cost overruns and schedule delays of construction projects in Qatar (Jarkas & Younes, 2014; Memon & Abdul Rahman, 2014; Syed Jamaluddin et al., 2014). Most cost overruns in infrastructure projects in Sweden occur at any time from the planning phase to final design stage because of the uncontrolled change orders and the ensuing input required for technical and administrative reasons (Lind & Brunes, 2015). Design problems factor is the single largest contributing factor to costs overrun and schedule delays in Turkey (Polat et al.,

2014). Problems associating this factor include design changes, late design approvals, design discrepancies, and buildability problems (Polat et al., 2014).

The poor and often ambiguous project scope outlined in the contract is another leading cause for project failure, along with cost overruns and schedule delays (Cheng, 2014; Harding, 2012). Project designers and contractors need to develop utterly clear scope in their contracts with the client to reduce overrun and schedule delays (Cheng, 2014; Harding, 2012). Many developers in the construction industry in Korea consider the early stage cost estimate as a critical phase in making important decisions for the project development (Jin, Han, Hyun, & Kim, 2014). Early stage cost estimates miss a large amount of details and information because such data are uncertain or unavailable at the project inception stage (Dominic & Smith, 2014). Approximately 37% of the assumptions made at earlier stages of the projects lifecycle are invalid and have negative effects on the project process, which may create extra materials cost and delays caused by rework (Gao et al., 2014).

Weak design documents have a significant effect on cost overruns in Malaysia (Abdul Rahman, Memon, & Abd Karim, 2013). Unclear texts and numeric data in the tender documents at tender stage may create cost overruns because of misinterpretation (Rosenfeld, 2014; Williams & Gong, 2014). Such misinterpretation causes differences between the actual cost and planned cost, where the bidders need to clarify such ambiguity at tender stage to allocate sufficient budget for the project construction stage (Rosenfeld, 2014; Williams & Gong, 2014).

Poor management of client requirements and expectations at the design stage and lack of integrating the design of project systems are contributing factors to cost overruns and schedule delays (Jallow et al., 2014). Lack of understanding the design requirements of authorities and end-users creates rework and subsequent cost overruns and schedule delays (Alinaitwe et al., 2013). Delay in producing the design package by the agreed time in GCC countries is a major contributing factor to project delays (Al-Sabah et al., 2014).

Project size, the number of bidders, location, and type of project affect the bias in cost estimation in Malaysia (Azman et al., 2013). The contract duration affects the consistency of cost in Malaysia (Azman et al., 2013). Senior managers may improve the results of projects in comparison to original estimates by utilizing historic data in combination with design details and proper cost planning (Azman et al., 2013).

Cost overestimation in Malaysia may be the result of political directives and pressure in most cases (Azman et al., 2013). This pressure influences the decision of the deciding officer to forecast overestimated cost to impress the senior management while providing misleading information of completing the project within the projected budget (Azman et al., 2013). Continually improving the pre-design stage to provide more accurate estimations and more value for money is important (Azman et al., 2013). Engaging players such as the client, financial representative, land surveyor and geotechnical experts, materials engineers, and suppliers in the estimation process is helpful to improve the whole project cost estimation (Ochieng, Shedrack, & Douglas, 2015).

Client Related Factors

There are several reasons for cost overruns and schedule delays caused by the client. The lack of budget planning by clients results in cost overruns and schedule delays in construction projects (Amoatey et al., 2015; Choudhry, Aslam, Hinze, & Arain, 2014; Harding, 2012). A late payment to contractors is another factor contributing to schedule delays because the subsequent effect is the contractor inability to pay subcontractors and suppliers on time (Alinaitwe et al., 2013; Amoatey et al., 2015; Shehu et al., 2014). Most of the financial difficulties that contractors face in the construction business in Qatar are the result of a late payment made by the client because of the lengthy process while releasing the claimed fund (Jarkas & Younes, 2014). The selection criteria decided by the client to the project bidders affects the quality and reliability of cost estimate (Dominic & Smith, 2014). Selecting the lowest bid affects the decision and action of the cost estimator who may underestimate the cost at tender stage, which creates a need for an experienced client representative to manage cost growth from the earlier stage of projects, especially for mega projects (Dominic & Smith, 2014).

In 2014, more than 59% of cost overruns in construction projects in Singapore were from CRR (Hwang et al., 2014). Contractors in Qatar consider the most critical risks in construction projects to be those related to the clients (Jarkas & Haupt, 2015). Top risks that may cause project cost overruns and schedule delays are related to changes from the client side (Alinaitwe et al., 2013; Amoatey et al., 2015; Hwang et al., 2014; Jarkas & Younes, 2014; Ochieng et al., 2015; Rosenfeld, 2014; Syed Jamaluddin et al., 2014). Change orders from the client side exist in the form of scope changes and CRR

during the construction stage. Senior managers need to conduct a cost-benefit analysis before making the decision of constructing any project because there could be an alternative option instead of building a new one (Singhania, 2013). Such alternative may be leasing or refurbishing an existing building rather than constructing a new project.

Contractors in Taiwan won 61% out of 79 litigation delay cases against clients because the delays were mainly created by the clients who changed the scope and order of work and delayed site handover to the contractor to start the work (Yang et al., 2013). Clients are responsible to write a clear project brief for the designers and contractors. Successfully interpreting the project brief at the early planning and design stages could eliminate the need for rework during construction, which contributes to reduce cost overruns and schedule delays (Collinge & Harty, 2014). Considering the previously mentioned client-related factors, senior managers need to develop more strategies to help clients understand the relationships between CRR and cost overruns and schedule delays. By collaborating with the client in this manner, the senior manager offers an improvement to controlling the project cost and time.

Contractor Related Factors

Contractors in Qatar consider risks created by contractors as the third most critical in construction projects, after those related to the clients and consultants (Jarkas & Haupt, 2015). Project planning and control is an effective scale to examine the project success (Turner & Zolin, 2012). Top contractor related factors causing cost overruns and schedule delays in GCC countries are poor site management, inadequate planning, poor procurement and works scheduling, inappropriate schedules control, problems with

subcontractors, delays in materials deliveries, weak communication among stakeholders, and lack of early stage interaction with vendors (Ruqaishi & Bashir, 2015). Contractor site management, information and communication, human resources, non-human resource, and lack of project monitoring and control factors have significant contribution to cost overruns in Malaysia (Abdul Rahman et al., 2013; Alinaitwe et al., 2013; Choudhry et al., 2014; Dominic & Smith, 2014; McCord et al., 2015, Memon & Abdul Rahman, 2014; Syed Jamaluddin et al., 2014).

Contractor poor site management and contractor-related financial problems have the most significant negative effects on cost overruns in Malaysia, regardless of the project capacity (Abdul Aziz, Memon, Abdul Rahman, & Karim, 2013; Abdul Rahman et al., 2013; Memon & Abdul Rahman, 2013; Shehu et al., 2014; Syed Jamaluddin et al., 2014). The subcontracting option of labor in Nigeria has the highest effect on introducing wastage that contributes to 21-30% of cost overruns (Oko John & Itodo, 2013). Outsourcing is a technique that has a negative effect on time and cost of the engineering projects (Lisse, 2013).

Contractor lack of competency to cost management and dispute control is a critical contributing factor to cost overruns and schedule delays in Taiwan (Cheng, 2014; Choudhry et al., 2014). Contractors occasionally adopt inappropriate estimation to person-hours at tender stage to accept as many orders as possible and maintain competitive bidding situations, which increases the risk of cost overruns because the contractor is the only one responsible for resources management (Ishii, Takano, & Muraki, 2014; Rosenfeld, 2014). Approximately 10% of the projects in Nigeria are in line

with the planned schedule, with an average of schedule delays of over 24% of the initially planned project duration (Aiyetan, 2014). The main reason of rework in Nigeria is the contractor performance while executing the construction work at the site, whereas all construction projects of Nigeria suffered cost overruns of which the rework related cost overrun ranged between 0.6 - 5.0% of the initial contract price (Aiyetan, 2014).

A planning engineer may intend to provide an inaccurate schedule to impress the management and other important stakeholders with an unrealistic project schedule, which causes schedule delays that stakeholders were not aware of at an earlier stage (Eizakshiri, Chan, & Emsley, 2015). This disconnect between the managers and supervisors during the planning phase, and during the appearance of the actual causes of time variation is the main reason for delays (Russell, Hsiang, Liu, & Wambeke, 2014). A factor causing schedule delays in the United States is the incorrect consideration of time buffer (Russell, Howell, Hsiang, & Liu, 2013; Russell et al., 2014). A time buffer is allocated extra time for individual activities to cover the risk of delays that may occur during this phase of the project lifecycle (Russell et al., 2013; Russell et al., 2014). The top 12 most frequent causes creating the need to time buffers in the United States include the project complexity, trades tasks complexity, documents quality, project size, coordination with other subcontractors and suppliers, project duration, constructability, intended scope changes, procurement durations, material transfer method, site logistics, and weather (Russell et al., 2013). Twelve most severe causes creating the need to time buffers are documents quality, project complexity, trades tasks complexity, intended scope changes, weather, constructability, project size, site logistics, strict specifications, quality control

requirements, low repetitions of work, and late delivery of materials (Russell et al., 2013).

Other Stakeholders Related Factors

Stakeholder engagement is a critical project success factor (PSF) that has a positive effect on minimizing cost overruns and schedule delays (Turner & Zolin, 2012). Senior managers should consider six aspects while managing the stakeholders (Storvang & Clarke, 2014). The six aspects include identifying the stakeholders in construction, what influence they have and what they can do when involved, which stages need their involvement, how to involve them, how to create a space for meeting them, and identifying their useful information and input needed to enhance the development process. When roles and responsibilities are clear among stakeholders across the project lifecycle, less chance exists for gaps in any stage of the project phases, which may introduce positive indicators of enhanced project control process and relationships (Doloi, 2013). The PM team needs to have sufficient information about the project, be able to make an accurate analysis to the information, and draw an outline of the project strategy for all stakeholders to understand and align with and improve the project quality (Heravi, Coffey, & Trigunarsyah, 2015). Aligning key stakeholders to the project strategy in Australia at different stages of the project lifecycle has a direct and significant positive effect on the quality of the project (Heravi et al., 2015).

Mega construction projects need effective management to stakeholders to avoid potential conflicting interests among those players (Mok, Shen, & Yang, 2015). A primary project success factor in mega construction projects is the ability to succeed in

managing the stakeholders and their requirements to avoid reworks at handover stage (Alinaitwe et al., 2013; Mok et al., 2015). The concept of management-of-stakeholders has a consideration to the stakeholder as providers for resources, and influence potentials to help or harm the project (Eskerod & Huemann, 2013). The adoption of management-for-stakeholder encourages the management team to frequently interact with all stakeholders and results in positive effects such as timely project completion and meeting the project budget. The goal is to adopt a win-win strategy (Eskerod & Huemann, 2013).

Various preliminary project information visuals such as schematic drawings, images, and briefing texts cause different understanding from the intended interpretation of the designers and external professional client advisors (Collinge & Harty, 2014). Such different interpretations may lead to producing a design that deviates from the requirements of the client and other stakeholders (Collinge & Harty, 2014). Lack of coordination and communication among the stakeholders to establish shared project objectives may contribute to cost overruns and schedule delays (Elmualim & Gilder, 2014). Project cost overruns have a direct relation to the knowledge, decisions, and actions of the involved stakeholders (Love et al., 2013).

Information and communication factors play a significant role on project cost overruns in Malaysia (Abdul Aziz et al., 2013; Abdul Rahman et al., 2013; McCord et al., 2015). Creating more opportunities for workshops and meetings among stakeholders may diminish the potential for misunderstanding (Storvang & Clarke, 2014). Involvement of stakeholders through workshops and different forms of communications may provide enhanced insight into the project concerns, values, and needs (Storvang & Clarke, 2014).

Factors Related to Lack of Project Management Office Support

PMO involves a team that is responsible for timely completion of the projects within the allocated budget, and supports achieving the strategic alignment between the initiated projects and corporate strategy (Kaleshovska, 2014). The team that facilitates achieving strategic success is the project support office that creates and forwards solutions to organizations for optimizing managing the business (Mariusz, 2014). The PM framework and the systematic control of the work lifecycle have a positive influence on the performance of the project team (Harding, 2012; Mir & Pinnington, 2014). Achieving construction productivity improvement needs more systematic strategic approach than just productivity measurements (Kenley, 2014). PM has at least around 45% positive influence of PM performance on project success but less effect on project efficiency (Mir & Pinnington, 2014). Five major constraints to achieving success in the PM practices are weak PM knowledge base, lack of defined role of the project manager, poor understanding of procurement practices, weak institutional framework, and poor communication protocols (Kissi, Ahadzie, & Badu, 2014).

A critical success factor for any project is the existence of a PMO within the organization to provide leadership for the project (Hjelmbrekke, Laedre, & Lohne, 2014; Kaleshovska, 2014). Project governance is a value creation management framework that refers to set of policies, processes, procedures, and roles and responsibilities, which are critical elements for project decisions that need aligning with the business goals (Jordan, 2014; Kaleshovska, 2014; Mariusz, 2014). The organization chart is a guidence to know who in the company is responsible for any activity within the organization. Without

developing a project governance, no organization chart is likely to exist, and there might be difficulties in making and communicating decisions related to controlling the project time and cost because project governance is the team responsible for communicating this process (Hjelmbrekke et al., 2014; Kaleshovska, 2014). Too and Weaver (2014) proposed a conceptual framework for project governance with four fundamental elements to improve the project performance and create value for the organization. The four elements are portfolio management, project sponsorship, PM offices, and projects and programs. The basis of the four elements was that without effective support of the organization governance, the PM team could not operate appropriately, which did not have a record in the literature (Too & Weaver, 2014). Project success or failure is not entirely in the hands of the PM team, but mainly in the hand of the organizational governance team (Too & Weaver, 2014).

Spalek (2014) advised investing in PM standards, tools and techniques, and in the competencies of people who are involved in the projects. Investing in PM organization has qualitative benefits to the project and leads to a systematic process that reduces the project risks, improves the team performance, and enhances the satisfaction of the stakeholders (Lappe & Spang, 2014). The presence of PM in managing construction projects proved the enhancement to projects performance and justified the increment of the return on investment (Lappe & Spang).

A gap exists between contemporary management needs and what the education and training organizations provide (Ramazani & Jargeas, 2015). The identified gap between the training courses and the work environment created the need to explore the

benefits that training and education institutions could gain from experienced project managers for the future courses (Ramazani & Jargeas, 2015). Setting universal project success criteria is not possible because construction projects are complex and unique (Ling & Ang, 2013; Mir & Pinnington, 2014). PM practice is not enough by itself to achieve project success but needs proper control systems to enhance the enterprise success (Ling & Ang, 2013; Mir & Pinnington, 2014).

Many organizations lack the value of lessons learned from previous mistakes, known as institutional memory. Organizations need to be transparent in the sharing of critical problems experienced in earlier projects (Carrillo, Ruikar, & Fullar, 2013). Building a knowledge management system of strategic business goals is effective to achieve openness (Carrillo et al., 2013). Knowledge management provides benefits to the organizations, such as minimizing project risks and eliminating potential surprises (Michels, Grijo, Machado, & Selig, 2012). Cost, time, and quality are the most common management intentions in construction (Meng, 2014). There is a significant positive effect from the early problem detection techniques on problem solving and project performance in term of cost, time, and quality, which needs a proactive approach of the management team (Meng, 2014). A positive effect exists when using the methods, techniques, and tools of knowledge management, which are available for the project manager on different stages of the project lifecycle (Michels et al., 2012).

Senior managers establish a risk management plan as an important live document on the organizational level to manage the projects (Jordan, 2014). Risk managers in UAE consider only the risk factors without taking into account the control measures for project

success, which needs the attention of the PMO to manage the identified risks systematically (Motaleb & Kishk, 2014). Poor application to quality management systems in the developing countries causes design revisions and construction reworks, which contributes to cost overruns and schedule delays (Alinaitwe et al., 2013). Approximately 50% of construction companies with implemented performance measurement and benchmarking asked to promote the use of management strategies to add values to the capital projects while performing on both projects and portfolio levels (Hwang, Tan, & Sathish, 2013).

Knowledge and Management Tools Related Factors

Project managers need to equip themselves with the essential knowledge, communication skills, and qualifications for successful implementation of the PM process and practices (Kissi et al., 2014). Researchers addressed the essence of applying the PMBOK techniques, tools, and skills in Asia to achieving project success because many projects suffered significant recorded failures in term of cost overruns and schedule delays (Chou, Irawan, & Pham, 2013). The application of the PMBOK in adapting the standards to government organizational culture in the United States improved the performance of government projects, particularly when applying the necessary training for the dedicated managers (Fanning, 2014).

The PMP is a document considered as one of the most important tools to achieve project success (Allen, Alleyne, Farmer, McRae, & Turner, 2014). PMP is a comprehensive document that includes project goals, objectives, and scope of the project (Allen et al., 2014). Escamilla (2013) developed a model to examine the relationship

between the practices of PMP and project success for renovation projects of historic value in Texas. Escamilla (2013) found that there is no common uniformity in the perception of project team members to how PMP practice predicts project success for renovation projects.

The project planning and control measures are critical factors that have a significant effect on the project cost performance, where the contractor and the client share the role to implement appropriate construction methods and effective monitoring and reporting procedures to reduce potential common mistakes and errors (Doloi, 2013). The quality of techniques used in risk identification, adequacy of information used for scheduling, and adequate float used while scheduling projects are effective for controlling the project time and cost (Ling & Ang, 2013).

The type of construction project may influence the choice of the scheduling techniques (Tang, Liu, & Sun, 2014). Most schedules and cost baselines that project managers derive using program evaluation and review technique (PERT) are optimistic, which may contribute to cost overruns and schedule delays (Acebes, Pajares, Galan, & Lopez-Paredes, 2014). The dynamic buffer is a mechanism that planning managers use to keep the buffer and adjust it only when needed while estimating durations (Wang, Cheng, Tseng, & Liu, 2015). Researchers advised to use a dynamic buffer when estimating the project budget and schedule to produce better and more reliable forecasted cost and time (Khamooshi & Cioffi, 2013). Introducing such buffers to estimations provides the needed flexibility that accounts for the possible errors in cost and time estimates during the planning phase (Khamooshi & Cioffi, 2013).

Delays in the traditional construction projects in Singapore are over 15% of projections whereas in the green construction projects it is over 32% of projected overruns (Hwang & Leong, 2013). New green-related technologies are essentials for green constriction projects, which require more time to understand (Hwang & Leong, 2013). Decision and policy makers in developing countries need to adopt agile energy alternatives of shorter construction time compared to time-consuming energy megaprojects that need extra care in developing a well-studied risk management plan (Ansar et al., 2014). A well crafted risk management plan is critical to the success of all building construction, particularly but not limited to international projects (Yildiz, Dikmen, Birgonul, Ercoskun, & Alten, 2014). A knowledge-based risk mapping is a successful risk management tool for assessing factors that affect cost overruns, which is a good technique for future projects (Yildiz et al., 2014).

Effects of Models and Charts

Charts are useful to forecast the project status and rectify overruns and delays when occur (Aliverdi, Naeni, & Salehipour, 2013). Schedule float is the number of days that the planning manager can use without delaying the project (Al Haj & El-Sayegh, 2015; PMI, 2013). Researchers developed several models to minimize the problem of losing the float that senior managers allocate in the project program for the construction activities (Al Haj & El-Sayegh, 2015). Jin et al. (2014) enhanced the case-based reasoning (CBR) model, of which the application of the enhanced model resulted in more accurate construction cost estimates in multi-housing projects. Dominic and Smith (2014) developed a model to distinguish causes of underestimation from cost overruns. Dominic

and Smith highlighted that the causes of cost growth are overruns and underestimation. Dominic and Smith (2014) achieved an average percent error of 3.67% by using that model. Managers in the 20th century used to design and follow traditional models for managing cost and time by depending on individual decisions that resulted in more errors than designing group decision-making models (Heravi & Faeghi, 2014). Those early models include decisions with no correlation between cost and time. Heravi and Faeghi (2014) proposed a group decision making model for optimizing time, cost, and quality, and reduced the errors of earlier traditional models.

Warburton (2014) developed a theoretical model as a grounded theory to combine Allen's labor profile and the Earned Value Management (EVM). Warburton (2014) derived a formula that the construction companies can use for projects in earlier development stages to estimate the project schedule. PERT is a common practice used in construction projects but found to include bias and may have a problem of unavailable information and certain level of implementation difficulties to practitioners (Khamooshi & Cioffi, 2013). No real-life Critical Path Method (CPM) example matched the projected costs at the project completion stage (Khamooshi & Cioffi, 2013).

Many studies included proposals of project control methods and mechanisms for projects under uncertainties. An example is a method that the management professionals used to integrate EVM with the project risk analysis, which helped project managers to examine whether the project deviation is within the expected tolerance and timelines or out of control (Acebes et al., 2014). Senior managers use simulation system to analyze the productivity of complex infrastructure projects, which enhances comprehension of

knowledge and increase problem-solving ability with the achievement of appropriate decisions (Panas, Pantouvakis, & Lambropoulos, 2014). Automated look ahead scheduling during the late construction phase is a useful tool that managers use to improve the flow of work and to reduce potential rework, which improves the budget control and meeting projected timelines (Dong, Fischer, Haddad, & Levitt, 2013).

BIM is an open data tool that design and PM consultants use to minimize errors and underestimations that bidders cause on occasions during the tender stage (Elmualim & Gilder, 2014). Bidders often underestimate when calculating the cost during the tender stage of the project lifecycle (Pucko, Suman, & Klansek, 2014). The first country that mandated the use of BIM was Finland in 2007 (Travaglini, Radujkovic, & Mancini, 2014). Investment in BIM for architecture engineering and construction (AEC) in the United States is profitable because BIM provides timely solutions to the design of construction projects, particularly, but not limited to, large projects (Lu, Peng, Shen, & Li, 2013). Engineers other than architects can use an updated 3D model to provide other elements of the design such as structural and electromechanical elements (Pucko et al., 2014). Managers used BIM to provide lower cost environment for learning PM practice by recognizing the learning effects of BIM on the construction tasks (Lu et al., 2013). Construction managers use BIM to reduce a gap exists between managing the introduced information and the PM (Travaglini et al., 2014).

Ma, Wei, and Zhang (2013) produced a model in China to form a semi-automated cost estimation in compliance with the project specification by implementing BIM, which can be a successful model for application in other countries. Researchers generated a

software application called building information modeling cloud score used for benchmarking. By using this software, an organization can benchmark itself against other BIM competitors, and plan for improvement (Du, Liu, & Isaa, 2014). Last Planner System (LPS) are a collaborative planning systems that managers use to engage all members of the project team instead of acquiring limited members (Russell, Liu, Howell, & Hsiang, 2015). Managers use LPS for completing the planning schedule, which enables the management team to focus on the most critical areas under risks of uncertainties (Russell et al., 2015). Management teams who use LPS have more understanding to the root cause of time buffer than those practitioners using traditional planning methods, which helps the scheduling and control managers to plan the project in more accurate details through proper allocation to time buffer where needed (Russell et al., 2015). The use of LPS reduced the time buffer and shortened the project of 24 months by four weeks, with a cost saving of one and a half million dollars out of 211 million dollars expected cost (Russell et al., 2015).

Project managers can use an engineering model named “TACTICS” to examine the benefits of applying fast-track method when executing construction projects (Cho & Hastak, 2013). A fast-track technique is useful for construction managers targeting the profit to be higher than the operational cost (Cho & Hastak, 2013). Practitioners can use a web-based system named “WRATTCO” to identify and assess the risk factors affecting the project cost and time (Memon, Abdul Rahman, Zainun, & Abd Karim, 2014). A disadvantage of WRATTCO as an electronic system is that it may not include the human sense in assessing the risk factors and related contingency plan (Memon et al., 2014).

When introducing a creative model or concept to an organization, senior managers need to consider the potential reaction of project teams. The project teams may link the creative tasks to the project control, informally accept the task progressively, or deploy special resources to realize and interpret the desired creativity that senior managers introduce to the project (Maier & Oana, 2014). Researchers concluded positive results accrued to project cost and time management by using charts to forecast their status and rectify overruns and delays when they occur (Aliverdi et al., 2013). Models are meaningful tools to control the project time buffer allocated for the construction activities (Al Haj & El-Sayegh, 2015). Senior managers need to design models and charts that improve controlling the project cost and time.

Factors Related to Project Management Competency

Project managers have a significant influence on achieving project success (Wu & Passerini, 2013). One main factor contributed to the success or failure of the project is the characteristics of the project manager, which includes the understanding of lessons learned, building a good relationship with the stakeholders, and establish and maintain teamwork (Allen et al., 2014). The complex requirements of PM competency for large projects need performance measurements for alignment and rectification (Dogbegah et al., 2013). Professional ethics and management problems are factors that influence cost variance in Malaysia (Syed Jamaluddin et al., 2014).

Most construction project managers have civil or architectural undergraduate degrees but no specific management degrees (Gonzalez, Casas, & Coronado, 2013). The lack of presence of management degrees affects the development of project managers to

PM techniques and innovative thinking (Gonzalez et al., 2013). Construction projects managers can improve their competence through educational and training programs that students and professionals implement to transfer the learning process into dynamic inputs (Panas et al., 2014). Despite clear treatment of bodies of PM knowledge to several managerial problems, there is a lack of adoption of the monitoring and controlling techniques (Montes-Guerra et al., 2014). Inadequate training to the senior managers caused a lack of exercising those monitoring and controlling methodologies and techniques (Montes-Guerra et al., 2014).

Poor PM and contract administration have a significant contribution to cost overruns, particularly but not limited to large construction projects (Abdul Rahman et al., 2013; Alinaitwe et al., 2013; Yusuwan & Adnan, 2013, Memon & Abdul Rahman, 2014). There is a strong positive correlation between emotional intelligence and project performance of the project managers, especially for large-scale and complex projects (Zhang & Fan, 2013). Several factors affecting the management of client requirements include an ambiguity of line of authorities for change orders, improper record of changes and managing client requirements at the design stage, lack of inventories, and integrity problems among systems used while designing the project (Jallow et al., 2014). Documenting projects systematically is important. The prediction of cost overruns occurrence may become clear with systematic documentation, of which the project control manager may design and implement effective measures to reduce the risk of price escalations (Lind & Brunes, 2015).

Project Type and Regional Related Factors

A financial crisis may have an indirect contribution to cost overruns and schedule delays. A reduction in the company profit is the only direct consequence of the 2008 global crisis through increased prices of building materials and fuel (Lia, Abdul Aziz, & Chan, 2014). Organizations in the construction industry in Singapore faced a challenge in achieving international market and tested the importance to use widely used performance measurement system and benchmarking, where only 19% of the companies in the construction industry in Singapore applied benchmarking (Hwang et al., 2013).

The primary project development client in Palestine is the government (Mahamid, 2013). The building sector is the primary industry that affects the economy of Palestine where the complication in the public project is more than in the private (Mahamid, 2013). Several factors affecting the project time in Palestine include the contractor financial capability, late payments by the client, the political situation in the West Bank, poor communication among leading construction teams, unavailability of equipment, the existed competition among bidders and awarding to the lowest bidder, and unrealistic project time frame (Mahamid, 2013; Mahamid, 2013). The major contributor to such factors is the Israeli authorities who negatively affect the performance of the construction projects in Palestine because of the limitation in the delivery of materials and equipment between the borders, and the restriction in movement of people (Mahamid, 2013).

All GCC countries have a similar economy, social, and politics (Al-Sabah et al., 2014; Jaeger & Adair, 2013; Ruqaishi & Bashir, 2015). Risks of wars, political situations, regulations and legislations and potential changes, and climate changes have a significant

effect on project cost and time performance in GCC countries (Al-Sabah et al., 2014). The internal risks of most significant effect on project cost and time performance in GCC countries are related to mistakes and delays while developing the project design, construction changes, and poor definition of the scope (Al-Sabah et al., 2014).

The most critical factors causing delays in the state housing construction in Ghana are late payments to the contractors, fluctuation and inflation in resources prices, fund availability by the clients, change requests (variation orders), and weak financial capability in the market (Amoatey et al., 2015). Organizational and regional cultures are important contributors to achieving high corporate performance through good PM practice in a particular business environment (Jaeger & Adair, 2013).

The dominant cultures in the construction projects of GCC countries are the group and hierarchy cultures, which are in line with the national culture in GCC (Jaeger & Adair, 2013). Teams may act in different ways based on various cultures. Understanding the implications of cultural differences on projects financial success or failure is important to avoid project crisis such as termination (Khan, 2014). When a client terminates a plan, there would be a negative economic effect and social implications on all stakeholders (Khan, 2014). Differences exist in the culture of Chinese construction management teams when managing overseas projects in UAE, particularly but not limited to the time spent for orientation to cultural issues and the level of uncertainties in the international projects (Khan, 2014).

Most construction project managers in GCC countries interact intensively with professionals from different nationalities and various cultures (Jaeger & Adair, 2013).

Mega construction projects in GCC countries involve Western project parties of different cultural background, which has a positive effect on the construction projects in GCC (Jaeger & Adair, 2013). Mega construction projects in GCC countries have a negative influence on Western project parties in areas of common local values (Jaeger & Adair, 2013). There is an emerging booming in construction in Qatar with a demand to produce more construction projects after the awarding of FIFA 2022 World Cup. Senior managers in construction need to realize that despite the available technologies in construction projects, humans remain of most intensive effect on the performance and productivity of the construction projects (Jarkas et al., 2014).

Delay in construction projects is the norm in the global market, especially in developing countries such as GCC (Jarkas & Younes, 2014). This delay contributes to significant risks of developing financial difficulties and potential complications in the relationship among the project parties, which may cause serious disputes and consequent arbitrations (Jarkas & Younes, 2014). Delays are the concern of the state of Qatar at this stage because the state of Qatar needs to complete all the construction projects related to FIFA 2022 on time. The main contributing factors to cost overruns and delays in GCC countries are related to materials availability, delivery problems, payment delays by the employer, client related reworks, poor design coordination and clarity of the drawings and specifications (Jarkas & Younes, 2014). Other factors are contractors financial problems, late responses among stakeholders, late client decisions, and availability of skilled resources (Jarkas & Younes, 2014).

The construction industry in Qatar is similar to that in other countries of GCC, where international project managers are mainly from India, Lebanon, Egypt, Jordan, and Syria, where they travel to GCC countries with different transactional expectations (Jarkas et al., 2014). Demotivational factors in construction in GCC are the lack of transactional incentive schemes, client delays making decisions, remuneration figure, and late responses to Request For Information (RFI) (Jarkas et al., 2014). Other demotivational factors in GCC countries are the lack of skilled workforce, materials shortage, clarity of design specification, recurrent change orders during construction, drawings clarity and quality, and rework (Jarkas et al., 2014). The highest factor is the financial package and remuneration.

Factors Related to External Risks

External risks of most significant effect on project cost and time performance in GCC countries are war risk, political situations, cost inflation, risks related to regulations and legislations, and potential changes, and climate changes (Al-Sabah et al., 2014). Materials availability is the most impacting factor in the construction business in Qatar (Jarkas & Younes, 2014). Fluctuation and inflation of materials prices is a significant factor contributing to cost overruns in Malaysia (Abdul Rahman et al., 2013; Alinaitwe et al., 2013; Amoatey et al., 2015; Dominic & Smith, 2014; Syed Jamaluddin et al., 2014). Cost estimators may forecast underestimated budget for large projects because they may exclude factors such as inflation and other provisional costs related to social and environmental issues, which causes cost overruns to around 75% of large dams (Ansar et al., 2014). Climate change has an effect on project time completion, of which every

month of delay in completing any construction projects results in income loss to the contractor of approximately 5.5% (Ballesteros-Perez et al., 2015). Studies in this literature review provide indications that different researchers might reveal different results of the most effective factors that influence cost overruns and schedule delays in construction projects. Such different results indicated the need for further studies in different regions and from different perspectives.

Transition

Section 1 was an introduction to the background of the problem, the problem statement, purpose statement, nature of the study, research question and interview questions, conceptual frameworks, operational definitions, assumptions, limitations, and delimitations, significance of the study, and a review of the professional and academic literature. I used a qualitative multiple case study to explore what strategies senior managers use to reduce cost overruns and schedule delays in construction projects. I reviewed the academic literature related to cost overrun and schedule delays. The primary finding of Section 1 was that different researchers reveal different results and findings concerning ranking the most effective factors on creating cost overruns and schedule delays, and what strategies senior construction project managers do to reduce overruns and delays. Researchers found that technical and financial factors related to contractors as the most critical factors that influence cost overrun and schedule delays. Other researchers found accuracy and correctness of design documents as the most critical factors whereas others found client changes as most influential. Factors related to the region and local culture are of variable effects, depending on the region.

The objective of Section 2 is further elaboration to the research method and design, role of the researcher, participants, population and sampling, ethical research, data collection instrument and techniques, data organizing technique, data analysis, reliability and validity, and the consent form. Section 3 includes a presentation of the study findings, including applications to professional practice, implications for social change, recommendations for action, and recommendations for future research.

Section 2: The Project

Section 2 of this qualitative case study includes further exploration of strategies that senior construction project managers use to reduce cost overruns and schedule delays. In Section 2, I provide the techniques for this study, starting with the purpose statement and justification of the selection of participants and including my selection of the research method and design, explanation of the population and sample size, statements on ensuring data saturation and ethical considerations, presentation of the data collection and analysis techniques, and consideration of the study reliability and validity.

Purpose Statement

The purpose of this qualitative multiple case study was to explore the strategies construction senior managers use to reduce cost overruns and schedule delays. The targeted population consisted of senior managers from three different construction PM companies who succeeded in reducing cost overruns and schedule delays in Qatar. Managers could improve the cost of living for residents of Qatar through reducing waste, which means a positive effect on social change (Senge et al., 2008). Applying strategies to avoid overruns caused by rework (waste) reduces the environmental impacts and contributes to maintaining a clean Earth (Kozlovska & Spisakova, 2013).

Role of the Researcher

The researcher in a qualitative study is the main instrument to collect, organize, and analyze the data required for the research (Collins & Cooper, 2014; Peredaryenko & Krauss, 2013); For my study, this included analyzing the data that I collected during the semistructured face-to-face interviews. Emphasizing PM knowledge and experience

during the interview enhanced the data collection process (Peredaryenko & Krauss, 2013), and my PM experience helped me accomplish this during the data collection. A strong relationship between a researcher and the topic can have a positive effect on reducing gaps in the data collected from the research participants (Bernard, 2013). Such a relationship also influences the understanding of the information presented by interviewees, aids comprehension of the secondary data, enhances recognition of the potential for participants to exhibit personal interpretation bias, and has a positive effect on awareness of researchers in avoiding their own biases (Irvine, Drew, & Sainsbury, 2013; Marshall & Rossman, 2016). Member checking contributes to minimizing personal bias and to enhances understanding of the data collected and the phenomenon under study (Harvey, 2015). Validating the collected data included member checking of the primary and secondary sources.

Researchers must follow the Belmont Report protocol and guidelines. While conducting primary and secondary data collection, a researcher must draw clear ethical boundaries that ensure protection of study participants (Gibson, Benson, & Brand, 2012). A researcher should make participants fully aware of the whole research process, including the interview protocol, prior starting data collection; interview protocols are important for creating and controlling an ethical and unbiased interview process (Jacob & Furgerson, 2012). I set clear ethical boundaries in my study and explained the whole process prior to beginning data collection by providing the participants a copy of the standard consent form.

Participants

I explored the research question with senior managers who succeeded in reducing cost overruns and schedule delays of construction projects. Identification of the research question parameters is helpful for the researcher in selecting the right participants among the whole population (Gray, 2013; Yin, 2014). The adoption of a purposeful sampling approach contributes to obtaining useful information on the topics from the selected participants (Robinson, 2014). Interviewing is a significant strategy for data collection in a qualitative study, and face-to-face contact is one way of communicating directly with participants (Mikene, Gaizauskaite, & Valaviciene, 2013). Also important, however, is selection of another source of supporting information (Frels & Onwuegbuzie, 2013; Jacob & Furgerson, 2012).

I utilized published information on the website to identify and contact business managers from three leading PM companies located in Qatar. I explained to each business manager the intention to interview one of their senior managers who had been successful in reducing cost overruns and schedule delays and to access any related information regarding a completed project as part of my research. The business managers provided contact details of two to three names of their successful managers. I randomly contacted one senior manager from each company. The interview protocol (Appendix B) included a copy of the e-mail used for contacting the study participants.

In considering purposeful selection while deciding the number of participants, a researcher needs to take into account the problem and its background, the research method, nature of the study, and the conceptual framework (Marshall, Cardon, Poddar, &

Fontenot, 2013). Researchers need to choose an appropriate number of participants without wasting time and effort while still achieving data saturation (Griffith, 2013). Three to five cases is a recommended number for a case study research (Roy, Zvonkovic, Goldberg, Sharp, & LaRossa, 2015). Three participants were adequate for my study to achieve data saturation because themes started to recur. The interview protocol (Appendix B) includes information regarding the ethical considerations I followed while conducting the study. Researchers have to protect the participants from any type of harm that would violate the Belmont Report guidelines and that may have a negative effect on study validity (Gibson et al., 2012; Teitcher et al., 2015). Researchers make a full explanation about the confidentiality and the study in an attempt to convince the participants in signing the consent form (Gibson et al., 2012; Teitcher et al., 2015).

Research Method and Design

The intention of this qualitative multiple case study was to explore what strategies senior managers use to reduce cost overruns and schedule delays in construction projects. Following subsections include justifications of the research method and design.

Research Method

Three research methods for conducting a doctoral study include qualitative, quantitative, and mixed method. The three methods have certain similarities and differences helpful for the researcher in deciding the best research method to achieve the researcher's goals (Bernard, 2013; Cunliffe & Karunanayake, 2013; Venkatesh, Brown, & Bala, 2013). A researcher needs to select the appropriate research method and line of inquiry for obtaining the required level of results (Yin, 2014). A researcher uses

qualitative research to procure valid and reliable knowledge of a phenomenon with deep, new insights into the context of the experienced phenomenon, findings researchers cannot obtain with statistical analysis (Berger, 2015; Hammer, 2011; Narag & Maxwell, 2014; O'Reilly & Parker, 2013; Wolgemuth et al., 2015; Yilmaz, 2013; Yin, 2014). The qualitative research method is useful for the researcher to explore and understand the perceptions of participants regarding the experienced phenomenon through open-ended questions (Gioia, Corley, & Hamilton, 2013; Montero-Marin et al., 2013; Willig, 2013; Yin, 2014).

A quantitative researcher provides statistical data of causal relationships (Barnham, 2015; Doloi, 2013; McCusker & Gunaydin, 2015; Yilmaz, 2013). The findings of a quantitative research are not with deep insight of the studied area because respondents cannot describe feelings but only state information represented from experience and facts (Barnham, 2015; Doloi, 2013; McCusker & Gunaydin, 2015; Yilmaz, 2013). Quantitative studies are helpful to researchers who need to examine and test correlations among variables to address a problem through quantifying the results aimed at proving or disapproving hypotheses (Frels & Onweugbuzie, 2013; Yin, 2014). The quantitative method was not appropriate for this study because I used open-ended questions withparticipants in order to answer the research question in deep detail. There was no need to explore cause and effect of the experienced phenomenon (Bernard, 2013).

The mixed method research is a robust research method that involves both qualitative and quantitative studies to gain more integrated and detailed information (Dogbegah et al., 2013; Guetterman et al., 2015; Maxwell, 2016; Ramlo, 2016). A

researcher conducts a mixed method study through several stages by following a sequential process of the qualitative and quantitative methods (Dogbegah et al., 2013; Guetterman et al., 2015; Maxwell, 2016; Ramlo, 2016). Mixed method research includes both open-ended qualitative exploration and a closed-ended quantitative approach (Venkatesh et al., 2013). The mixed method was not suitable for this research because of the longer time required, which I did not have for a doctoral study.

A researcher achieves data saturation when obtaining no more data or adding no new themes to the study findings during the research process (Henriques, 2014). A researcher needs to increase the number of selected cases to achieve data saturation if three cases are not enough for the study (Yin, 2014). Secondary data for the qualitative case study is mandatory to achieve data saturation and to conduct triangulation (Yin, 2014). The triangulation approach contributes to achieving the data saturation and presenting themes (Frels & Onwuegbuzie, 2013; Heale & Forbes, 2013). A researcher achieves data saturation when obtain no more data or themes to add to the study findings (Henriques, 2014). I used multiple sources of data such as semistructured interviews along with collecting and reviewing documents and archival records and followed by methodological triangulation to achieve data saturation. The insightful data obtained from the three cases was enough to achieve data saturation when themes began to recur and no new information emerged from interviews and recorded documents. I used member checking via a follow-up interview that was followed by methodological triangulation as recommended by O'Reilly and Parker (2013) for achieving satisfactory data saturation. My approach included a clear justification for the point at which I achieved data

saturation, which is important to convince readers that I could not produce new codes or themes to my research as recommended by Fusch and Ness (2015).

Research Design

The research question is an indicator for the researcher in deciding the research design. Several qualitative research designs include phenomenology, ethnography, grounded theory, narrative research, single case study, and multiple case study (Bernard, 2013; Hyeit, Kenny, & Dickson-Swift, 2014; Yin, 2014). The researcher selects the most effective research design to support answering the research question (Yin, 2014). The next subsections include details of each research design with justification for the selection decision.

Phenomenology. Phenomenological design includes in-depth exploration of the lived experience of a group of people by interviewing and observing participants through means of interactive methods, which starts with a description of participants and extends to to personal perspectives or lived experiences of the phenomenon (Davidson, 2013; Gray, 2013; Kafle, 2013; Perry, 2013). The phenomenological researcher can explain the occurrence of the phenomenon by using the description made by a group of individuals who have lived the experience (Willig, 2013). The phenomenological design was not appropriate for my research because my intention was to explore strategies of senior managers and not to describe the lived experience of individuals regarding a particular phenomenon.

Ethnography. The ethnography study is often an expensive, extensive, and prolonged process that researchers use to investigate what causes a problem or cultural

phenomenon (Bernard, 2013; Garson, 2013; Lichterman & Reed, 2015; Robinson, 2013; Staller, 2013). The researcher conducts several times of field interviews or recording observations to obtain historic values and beliefs of individuals, group, or a culture of the same race and location (Bernard, 2013; Garson, 2013; Lichterman & Reed, 2015; Robinson, 2013; Staller, 2013). The ethnography is appropriate to generate a perspective for the entire group with shared culture (Maxwell, 2013). The ethnography research was not appropriate for this study because I did not need to observe behaviors, ethnic groups, society, or culture (Leedy & Ormrod, 2013; Staller, 2013). The other reason for avoiding ethnographic design was the time and cost spent with ethnography.

Grounded theory. Researchers use grounded theory to generate a new theory with an explanation of the social or cultural process and interaction in the form of induction and deduction among people and groups (Bendassolli, 2013; Bryce, 2013; Yin, 2014). Grounded theory is an appropriate design for collecting and gathering data in often an extended time of interviews and observation, and create the theory from the collected information of the phenomenon under study (Bryce, 2013). I intended to explore the problem and answer the research question mainly through interviews. Grounded theory was not suitable for my study because I had no intention to generate a theory for the explored problem.

Narrative design. Researchers use narrative design to investigate *what, when, who,* and *how* parts of human experience and life stories through the participants' lens (Green, 2013; Yin, 2014). Narrative design influences the ability of the researcher to understand in-depth details of the participants lived experience by clearing any cultural

barriers that may be preventive to the investigation (Venkatesh et al., 2013). A narrative researcher forms the contexts of participants perspectives and experience through conducting interviews, questionnaires, observations, and pictures (Loh, 2013; Suarez-Ortega, 2013). The contexts formation often happens with unpredicted interference and interaction that may become a negative factor for participants to have a trust with the researcher, which affect the quality and reliability of the narrative research (Loh, 2013; Suarez-Ortega, 2013). I did not use narrative design because I wanted to maintain the trust with the participants and enhance the quality and reliability of the study.

Case study. The case study design is useful to investigate critical factors of a phenomenon, where a searcher has no control over the events of the phenomenon (Singh, 2014; Trangkanont & Charoenngam, 2014; Yin, 2014). Case study design is useful for a researcher to have multiple data collection approaches, which may be a single case or few cases used for emerging ideas from the multiple cases (Yin, 2014). Single case study design is appropriate for a research question of *how* or *why* with the in-depth investigation of the phenomenon (Cronin, 2014; Yin, 2014). Multiple case study is useful for a deep comprehensive investigation to provide a rich analysis of the explored phenomenon, where the researcher can address a *what* research question (Cronin, 2014; Yin, 2014). Three different types of case studies are exploratory, descriptive, and explanatory (Yin, 2014). The most advantageous type to address a *what* research question when a researcher has no control over the studied contemporary phenomenon is exploratory (Yin, 2014). I did not describe or examine the phenomenon but explored it to find an answer to the research question.

The study included three semistructured interviews with open-ended questions to provide insights and opportunities to add more data for addressing the research question (Effelsberg, Solga, & Gurt, 2014). I linked coding to the conceptual framework of PM theory to have a relevant and meaningful interpretation as recommended by Yin (2014). My secondary data collection method was through reviewing three projects (as three cases) that involved managers who succeeded in reducing cost overruns and schedule delays. I did triangulation to compare data obtained from the two data collection approaches, and form themes (Yin, 2014). My research method and design was a qualitative multiple case study as the most recommended approach to answering the research question and enhance the quality of the research.

Population and Sampling

Defining the Population

The focus of the study was to explore strategies that senior managers use to reduce cost overruns and schedule delays in construction projects in Qatar. The population in this qualitative case study consisted of three senior managers from different construction PM companies. The senior managers were those who succeeded in reducing cost overruns and schedule delays in Qatar in the past. This population is appropriate because senior managers reflect their point of view from the business management level (Li, Gray, Lockwood, & Buhalis, 2013). The reason for selecting purposive sampling technique during interview-based research is to have knowledgeable participants with experience in the explored phenomenon (Frels & Onwuegbuzie, 2013; Gray, 2013; Montero-Marin et al., 2013; Palinkas et al., 2013). Involving such experienced

interviewees is helpful to capture a variety of rich data presented through the view of those participants, which influences making generalized findings to the whole population (Frels & Onwuegbuzie, 2013; Gray, 2013; Montero-Marin et al., 2013; Palinkas et al., 2013).

Sampling

Sample size in a qualitative study has a direct effect on achieving data saturation and on the research finding (Cleary, Horsfall, & Hayter, 2014). Yin (2014) recommended small sample size between one and 10 participants for a qualitative case study. Knowledge and experience of participants in the explored phenomenon are essential to providing useful information for the research (Robinson, 2014). Sampling interview-based qualitative case study designs should not include a high number of participants but rather, small samples with a semistructured interview of open-ended questions to obtain rich data as the primary source (Robinson, 2014; Yin, 2014). The criteria for selecting the required number of participants in qualitative research is the ability to achieve data saturation and answer the research question through the selected sample size (O'Reilly & Parker, 2013; Yin, 2014). I selected three senior managers from different construction PM companies who succeeded in reducing cost overruns and schedule delays in Qatar.

Data Saturation and Sampling

The member-checking technique is useful to check the interpretation of the data collected during the interview (Harvey, 2015). My request to the participants was to validate my interpretation using the member-checking technique. My collection to the primary data was during the interviews and the secondary data through accessing

documents and archival records related to the three cases. The secondary data of each of the three cases consisted of the corresponding letters, emails, and other related documents. The triangulation approach contributes to achieving the data saturation and presenting themes (Frels & Onwuegbuzie, 2013; Heale & Forbes, 2013). A researcher achieves data saturation when there is no more information or themes to add to the study findings and increases the number of selected cases to achieve data saturation if the explored cases are not enough for the study (Henriques, 2014; Yin, 2014). My approach included clear justification to the point when I achieved data saturation as explained in the research method subsection. This approach is important to satisfy and convince readers that I cannot produce new codes or themes (Fusch & Ness, 2015).

Ethical Research

Including the ethical research subsection as part of this doctoral paper is important. Students are responsible for considering ethics when conducting university education (Gannon, 2014). Understanding research ethics by junior qualitative researchers is not easy without understanding the process, guideline, and protocols to conduct ethical research (Boyd et al., 2013; Sanjari, Bahramnezhad, Fomani, Shoghi, & Cheraghi, 2014). One concern to researchers is to collect true and accurate information from study participants. The informed consent is important to protect the welfare of participants while conducting scholarly studies (Kumar, 2013). I included the informed consent form and requested participants to sign and return after acceptance of the interviewees to participate in the study. I explained the informed consent process and related form prior obtaining the signatures of the participants for contributing to this

research. The form includes the research topic and benefits, the conditions of data collection and relevance to personal experience, acceptance to participation, a note of the right to withdraw from the study at any stage.

A researcher needs to have a sound knowledge of ethical research to understand the benefits of true and accurate data on creating a new understanding of particular science (Harvey, 2014). A researcher doing qualitative study needs to maintain a record of acceptances made by the participants to participate in the research (Yin, 2014). I recorded the related acceptances to participate in this study. Addressing the research question existed with maintained trust, honesty, and professional atmosphere throughout the whole study, which influenced sustaining a good reputation of Walden University. Following the informed consent process made the study participants comfortable to share opinions and disclose critical and sensitive information.

Institutional Review Board (IRB) is responsible for examining if researchers conduct human studies in compliance with the federal and state regulations, policies, and producers, with a target of optimizing the quality of the research in an ethical way (Cseko & Tremaine, 2013). I read and explained the approved IRB consent form provided by Walden University. The IRB approval number is 05-09-17-0530075. Check, Wolf, Dame, and Beskow (2014) recommended applying the National Institute of Health (NIH) for training the researcher to help to maintain the confidentiality of the study participants. My completion to the NIH web-based training was on March 14, 2015, and the certificate number is 1723718 (see Appendix A).

Participant withdrawal from the research has a negative effect on the study, but all interviewees need to understand their right to withdraw at any time (Thrope, 2014). The plan in this study was to make a clear statement that the participants are free to withdraw from the study at any time without penalties. I notified the interviewees that withdrawal could be through verbal or electronic communication and provided all my contact details. The participant had the right to retain the audio recording and notes recorded during the interview to destroy.

Researchers are responsible for maintaining the confidentiality of the companies and participants (Morse & Coulehan, 2015; Wallace & Sheldon, 2015). Coding participants influence a company and a participant decision to provide accurate and honest responses (Taylor & Land, 2014). I maintained confidentiality by coding companies with C1, C2, and C3 codes, and coding P1, P2, and P3 for participants and did not disclose names in my final research paper. The ethical research considerations included scanning all written notes of the collected data, saved the scanned documents and the audio record of the interviews on a digital drive, and stored the digital drive in a secured cabin with a lock for 5 years. I will provide a summary of the research result of my final paper to all participants as a form of incentives to participate in the research. I will delete all data from the digital drive at the completion of the 5 years.

Data Collection Instruments

The researcher is the primary data collection instrument (Mojtahed, Nunes, Martins, & Peng, 2014; Yin, 2014). The primary data collection instrument for this study was under my scope. Yin (2014) identified six sources of data collection for qualitative

case study design, which are interviews, direct observation, participant observation, the case study documents, case study archival records, and physical artifacts. Qualitative case study design must contain a minimum of two data collection methods (Yin, 2014). A researcher needs to have more than one data gathering technique, such as interviews, observations, and documents (Ozdemir & Adan, 2014). Data gathering technique used for this research was conducting interviews along with collecting and reviewing documents and archival records.

Semistructured interviews are helpful to acquire detailed and insightful responses from participants (Yin, 2014). The semistructured interview is helpful to make a structure while having flexibility during the interview process (Schaupp & Belanger, 2014). The face-to-face semistructured interview has more flexibility and control than a detailed interview (Mojtahed et al., 2014). Interviewees decided the date, time, and place for the interviews. Hallback and Gabrielsson (2013) conducted semistructured interviews as the primary data collection method. The secondary data collection methods of Hallback and Gabrielsson (2013) were the firm reports, newsletters, and other recorded documents. Weisheng, Liu, Hongdi, and Zhongbing (2013) conducted semistructured interviews to explore the procurement innovation for the public-private partnership in China. A researcher uses semistructured interviews to explore and reconstruct events explained through the lived experience and perspectives of the participants (Denzin & Lincoln, 2011). Semistructured interviews was the approach for this study where data gathering technique included conducting interviews along with collecting and reviewing documents and archival record. Shared characteristics of interviewing techniques are the rich details

and information provided in the interviews, the flexibility to elaborate, adjust, and deviate from the order while answering open-ended questions (Rubin & Rubin, 2012). The order of interview questions is helpful for the interviewee to provide information and build proper responses to make a useful contribution to answering the research question (Bernard, 2013). The interviewees need to prepare themselves for the interviews with a high level of comfortability. I stated my interview questions to all participants prior conducting the interviews.

Member checking is a helpful technique to validate the interpretation of information obtained during data collection stage (Harper & Cole, 2012). A researcher needs to do triangulation to examine the subject from different angles (Myers, 2013). Methodological triangulation is helpful to enhance the validity and reliability of analyzed data (Heale & Forbes, 2013). Ensuring the accuracy of interpretation and findings while organizing themes is useful to establish research validity and dependability (Koelsch, 2013). Two of the techniques to check themes in triangulations are interviews and records (Bird, Martin, Tummons, & Ball, 2013). I used triangulation as a useful practice to validate the collected data and findings by cross checking among multiple sources.

Establishing mutual involvement and interaction between the interviewer and interviewee is helpful to have a meaningful interview (Mojtahed et al., 2014). When the instrument of the study for data collection is the researcher, comprehending the social interaction during the interview process is important (Frels & Onwuegbuzie, 2013). Member checking with the participant is useful for critical analysis of the interpretation and findings made by the researcher during and after the interview (Harvey, 2015;

Koelsch, 2013; Marshall & Rossman, 2016; Robinson, 2013; Yin, 2014). I established mutual relations with the interviewees to enhance trust and comfortability for active interaction during the interview and validation process. Each participant examined the notes and checked my analysis to the statements made during the interviews, and corrected the disagreed recorded notes and interpretation.

I asked the interviewees to confirm their most preferred time to ensure participants comfortability, confidentiality, and privacy, where the interview protocols was a guidance for this research. Appendix B includes the interview protocols and interview questions. The interview protocol was my guidance during the interview process.

Data Collection Technique

The focus of this qualitative multiple case study was to collect the data related to strategies senior managers use to reduce cost overruns and schedule delays in construction projects in Qatar. The insightful point of view of the study participants is essential to answer the research question (Dangal, 2012). Three basic types of research interviews are a structured interview, semistructured, and unstructured (Myers, 2013). The structured interview includes formulated questions of restricted order. The semistructured interview includes formulated questions that could have flexible order and adherence. The unstructured interview has no formulated questions where interviewee can say what they like. The face-to-face semistructured interview has more flexibility and control than a detailed interview (Mojtahed et al., 2014). The semistructured interview is helpful to keep a structure while providing flexibility during the interview process

(Schaupp & Belanger, 2014). Face-to-face interviews are useful in qualitative research because participants have a flexibility and level of comfortability while sharing their experience of the topic (Peterson, 2014).

A purposeful sampling is a useful sampling technique to enrich understanding the problem because the participants may have specific knowledge and experience of the research topic (Omona, 2013; Robinson, 2014). The experience of the study participants increased understanding the problem and can be useful to respond to open-ended interview questions with insightful details (Mojtahed et al., 2014). The researcher needs to comprehend the social interaction to establish positive interaction with the participants and create a holistic account for answering the research question (Frels & Onwuegbuzie, 2013). Member checking is useful to make a critical analysis of the statements made by the participants and to validate the interpretation and findings made by the researcher during and after the interview (Harvey, 2015; Koelsch, 2013; Marshall & Rossman, 2016; Robinson, 2013; Yin, 2014). Probing technique is useful during the interview to gather additional information and obtain rich details (Rubin & Rubin, 2012; Yin, 2014). Secondary data for the qualitative case study is mandatory to achieve data saturation and to conduct triangulation (Yin, 2014). A researcher achieves data saturation when obtain no more data or themes to add to the study findings (Henriques, 2014).

Face-to-face interview of purposeful sampling was the technique used with participants who succeeded in reducing cost overruns and schedule delays in construction projects. Iphone 7 was the interview-recording device because it has clear voice recording feature. I established mutual relations with the interviewees to enhance trust

and comfortability for active interaction during the interview and validation process. I asked probing questions such as *could you elaborate more*. Using the cases archival record as the secondary data collection technique is useful to find and generate themes.

Following IRB approval, I contacted potential interviewees listed by their business managers who responded to the letter of cooperation (Appendix C). Letter of cooperation was part of IRB requirement, which I used as an access gateway signed by the business leaders to allow me to contact the participants. The interview protocol of Appendix B includes a highlight of the letter of cooperation. I asked all participants to sign the consent form before the start of answering the interview questions. Interviews were during the convenient date, time, and location of the participants. All interviewees asked to have the interviews in their offices during business hours. The interview protocol of this study was a guidance during the interview process. The time spent in each of the three interviews was approximately 40-50 minutes, and I notified participants of their freedom to take more time without restriction, which enhanced the level of comfortability to provide more insightful details.

I asked for the permission of interviewees to audio record the interview. Audio record is useful to capture all speech of the participants without any missed information during writing the notes when obtaining answers to the interview questions. I notified the participants of my plan to keep all collected data in an external hard drive for 5 years from the date of completing my doctoral study, and destroy saved items at the end of the fifth year. Some delays occurred with the interviews due to participant schedules. Similar challenges occurred in obtaining archival records.

Data Organization Technique

Pattern formation and identification, theme generation, and categorization are common approaches to organizing and analyzing data in a qualitative case study design (Patichol, Wongsurawat, & Johri, 2014). Labeling as a coding technique is a good method to organize the collected data and generate themes (Bernard, 2013). I used labeling technique while doing triangulation to create themes. A researcher ensures making the collected data available for future audits by storing the research data in a safe and secured place in accordance with the academic requirements (Gibson & Gross, 2013). A secured cabinet is a good place for safeguarding written information and digital backup drive for the data collected from participants (Mutula, 2014). I will store the soft collected data in a digital drive and keep in a secured cabinet in my storeroom at home for 5 years. Coding the participants has influence on their decision to provide accurate and honest responses (Taylor & Land, 2014). I maintained confidentiality by coding companies with C1, C2, and C3 codes, and coding P1, P2, and P3 for participants. I shredded hard copies of all notes and collected data, and will erase all digital details from the external hard drive at the end of 5 years.

Data Analysis

Data analysis stage of the qualitative study involves the collection of the researcher to all statements made by the participants during interviews, where those interviewees explore their experience of the phenomenon (Yin, 2014). Researchers ensure alignment of every interview question to the research question to gather the information related to strategies that senior managers use to reduce cost overruns and

schedule delays in construction projects. Transcribing the interview after completion is useful because data would be still fresh in the mind of the researcher and to ensure examining the responses ward by ward, which is helpful for interviewees to validate the accuracy of the recorded statements (Rubin & Rubin, 2012).

Before the conclusion of each interview, the participant and I agreed on a date and time for a follow-up interview in order to validate my interpretation of the interview. Following the completion of each interview, I interpreted the answers given by the participants by playing the recorded voice and wrote a summary. I delivered my interpretation to each participant by email within one to three days after the interview. In the member checking process, I made changes requested by interviewees to achieve the accuracy of interpretation. P1 asked to revise the interpretation made to one of his responses to the interview questions related to one theme named up-scaling marketplace as explained in table 1. P2 and P3 confirmed their concurrence to my interpretation.

Member checking was useful to avoid the inclusion of biased data in the study. Systematic review and interpretation of data collected from different sources is an essential part of the data analysis process of the qualitative research to understand meanings of the existing information (Frels & Onwuegbuzie, 2013; Lopez et al., 2014; Salajeghe, Nejad, & Soleimani, 2014). Using multiple sources of information is useful to conduct an insightful study of reduced bias (Yin, 2014). The primary collected data in this study was the answers given by the participants to the interview questions whereas the secondary source included letters, emails, project procedures and manuals, and reports.

Following the data organization technique addressed earlier in this study, the data analysis process commenced for the collected information as addressed by Yu, Abdullah, and Saat (2014). Coding is helpful to organize and categorize the collected data to identify themes (Marshall & Rossman, 2016; Yin, 2014). I listed and coded groups of responses to form coded themes, which was an appropriate stage to examine relevancy of recorded data. Data analysis for this research included reading my interpretation to the interviews to establish a correct understanding of strategies followed by the study participants. I identified potential concepts after repetitive inspection to the interview data and the scanned documents collected from the record. The triangulation process in the study included validating the answers given by the study participants against the secondary source of information. All secondary data presented by participants were in concurrence with the answers to the interview questions. Each of the identified themes includes more elaboration on the concurrency. The data inspection process contributed to developing a summary of the experience shared by the participant.

Triangulation is a data analysis process that researchers use to test the validity of the collected data against the information obtained from multiple sources (Fusch & Ness, 2015; Heale & Forbes, 2013). Triangulation is helpful to explore different perspectives and validates the findings (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014; Fusch & Ness, 2015; Heale & Forbes, 2013). Triangulation is a helpful technique to analyze data from different sources for the same topic (Myers, 2013). Using multiple sources of data to triangulate the study findings enhances the quality of a case study research (Yin, 2014). Researchers use methodological triangulation when having multiple

data gathering methods for the same topic, which is the most common technique used in qualitative studies (Carter et al., 2014; Heale & Forbes, 2013; Ozdemir & Adan, 2014; Wilson, 2014). Methodological triangulation is helpful to ensure that the collected data is rich and insightful (Fusch & Ness, 2015). Researchers use methodological triangulation to enhance study objectivity through collecting the data from different sources of information (Gatt, Grech, & Dodd, 2014). Methodological triangulation was the method used in this study to triangulate the interview data with the documents of the company, along with the archival records and the interview notes that I recorded based on my observation to the responses, which formed part of the validated interpretation. Each of the identified themes includes more detailed elaboration on the secondary sources used for each case study.

A researcher needs to examine the alignment of the collected data and emerged themes to validate the gathered data and triangulation steps (Heale & Forbes, 2013; Yin, 2014). I identified links between themes, existence of any centralized theme, and the pattern formed from different themes. The method used for coding was by labeling cards that correspond to my interpretation to each answer, without the need to use software for themes identification. Each labeled card represented a theme that I identified in the study findings subsection after interpreting each of the responses. Correlating emergent themes and patterns with the conceptual framework and literature review patterns is the basis to answer the main research question (Castleberry, 2014). I grounded the conceptual framework of this study with the PM theory. I compared the emergent themes with the PM theory and the patterns created from the literature review. I included new studies

published since writing the proposal as part of the themes created from the literature review portion.

Reliability and Validity

Reliability

Reliability of a qualitative study is the research dependability (Yilmaz, 2013). Researchers achieve reliability by conducting the appropriate research method and design, where future researchers may replicate the study to confirm the conclusions (Fusch & Ness, 2015; Noble & Smith, 2015). Reaching data saturation is essential to produce quality research (Fusch & Ness, 2015). Triangulation approach influences the achievement to data saturation (Frels & Onwuegbuzie, 2013; Heale & Forbes, 2013). A researcher can enhance the dependability of the study by using multiple sources of data in a case study design and making clear steps of the interview protocol (Yin, 2014). Member checking is useful to enhance the dependability of a study, where the researcher conducts short follow-up interviews with the participants to allow interviewees of reviewing interpretation made by the researcher to the information stated during the interviews (Harvey, 2015; Marshall & Rossman, 2016). A researcher demonstrates the reliability of a case study design by making precise definition and documentation to the research design and steps to enable future researchers of replicating the study (Ardhendu, 2014). I used multiple sources of data such as semistructured interviews along with collecting and reviewing documents and archival record, followed methodological triangulation to achieve data saturation, drafted clear interview protocol (see Appendix B), and performed member checking to enhance the reliability of the study.

Validity

Evaluating the validity of a qualitative study is essential for using the research findings in practices (Noble & Smith, 2015). Research validity is the term used for evaluating the quality of a qualitative study (Kihn & Ihantola, 2015). Providing accurate and honest information by the participants contributes to achieving research validity (Leedy & Ormrod, 2013). Valid research includes findings with similarity to other studies (Burchett, Mayhew, Lavis, & Dobrow, 2013). Evaluating a research validity is useful to provide evidence for practical training and development (Aravamudhan & Krishnaveni, 2015). A researcher needs to avoid the bias of data collection and finding, which is essential to maintain research validity (Lumsden, 2013). A researcher can isolate the research bias by avoiding pre-assumed beliefs and findings of the study (Chan, Fung, & Chien, 2013). Researchers use triangulation technique among multiple sources of data to enhance the research validity (Archibald, 2015; Emrich, 2015; Kaczynski, Salmona, & Smith, 2013; Leedy & Ormrod, 2013; Shoup, 2015; Yin, 2014). Member checking through a follow-up interview is useful for a researcher to achieve research validity (Marshall & Rossman, 2016). Gaining data saturation is useful to assure a research validity through achieving credibility, transferability, and confirmability (Yin, 2014). Triangulation is a useful technique to achieve data saturation (Frels & Onwuegbuzie, 2013; Heale & Forbes, 2013; Yin, 2014). Methodological triangulation is helpful to ensure that the collected data is rich and insightful (Fusch & Ness, 2015). Methodological triangulation and member checking contributed to enhancing the validity of this research. I ensured data saturation through using triangulation and conducted follow-up interviews.

Credibility. The credibility of research depends on the role of a researcher as the instrument in exploring and creating knowledge (Berger, 2015; Houghton, Casey, Shaw, & Murphy, 2013). Qualitative researchers tend to focus on establishing the study credibility as one way to ensure research validity (Khorsan & Crawford, 2014). Member checking is one of the best techniques to achieve credibility of the collected data in qualitative research (Harvey, 2015; Koelsch, 2013). Methodological triangulation is useful to achieve the credibility of research through ensuring exploring the information and data from the perspective of the study participant (Hallback & Gabrielsson, 2013; Heale & Forbes, 2013; Ozdemir & Adan, 2014). I followed the interview protocol and used member checking technique to enhance the credibility of the study.

Confirmability. Researchers need to make their study findings confirmable by others as a form of ensuring research validity (Thomas & Magilvy, 2011). Triangulation is a technique that researchers use to achieve research validity through confirmability. Researchers ensure confirmability by using multi-source of data and conduct the triangulation steps. Member checking is a practice that researchers follow to achieve or improve credibility (Leedy & Ormrod, 2013). Exploring the data analysis technique is a method that researchers use to evaluate the existence of bias (Thomas & Magilvy, 2011). The establishment of research confirmability by a researcher occurs after establishing dependability, credibility, and transferability (Frels & Onwuegbuzie, 2013).

Transferability. Transferability is another criterion for achieving research validity (Brysiewicz & Erlingsson, 2013; Yilmaz, 2013). Transferability is a technique that researchers use to provide rich and insightful data and findings for the readers to

analyze and compare with other researchers of the same context (Brysiewicz & Erlingsson, 2013; Crowe, Inder, & Porter, 2015; Vaismoradi, Turunen, & Bondas, 2013). Researchers confirm details of the research process as a form of achieving transferability (Yilmaz, 2013). Qualitative case study researchers tend to focus on particular context, population, and demography to provide insightful results (Bustamante & Moeller, 2013). The data collection included participants from the State of Qatar only, which is a limited area that may create a limitation to the generalizability and transferability. Judgment to the research transferability is beyond the control of the researcher (Tsang, 2014). Marshall and Rossman (2016) advised leaving the evaluation of study transferability to the future researchers.

Transition and Summary

The objective of this qualitative case study was to explore strategies that senior construction project managers use to reduce cost overruns and schedule delays. In Section 2, I provided the techniques I used to conduct the study. The purpose statement was the start of Section 2 followed by justifying the selection of participant. I explored and justified my decision to the research method and design, defined the population and sample size, stated how to ensure data saturation and ethical consideration, explored data collection and analysis techniques, and described the study reliability and validity.

Section 3 included explanation to my approach during data collection process, the interviews and archival record and documents, and the analysis techniques to the collected data. Section 3 included the study results and findings along with my

recommendations for professional practitioners and achieving positive social change. Section 3 included recommendations for future researches.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The objective of this qualitative multiple case study was to explore the strategies that senior managers used to reduce construction cost overruns and schedule delays. The data came from interviews along with collecting and reviewing documents and archival records at three PM companies in Qatar. I used semistructured interviews with the participants to answer seven interview questions. After each interview, I validated the answers with the participants. I conducted a follow-up interview and then reviewed the documents related to every case in this study. After finishing data collection and organization for the three case studies, methodological triangulation was the method used for analyzing the collected data.

Based on the data analysis of the interview responses and the reviewed documents presented by the participants as evidence of their strategies, seven main themes emerged from all three participants. The centralized themes were (a) master planning, (b) processes and procedures, (c) managing design stage, (d) procurement management, (e) use of software, (f) setting project cost and time, and (g) deciding clear scope. Nine minor themes were (a) risk management, (b) project brief, (c) construction methodology, (d) value engineering, (e) up-scaling marketplace, (f) time for tendering, (g) responsibility matrix, (h) training, and (i) monitoring the progress. The minor themes did not emerge from all participants but from one or two participants only as illustrated in Table 1. The findings revealed several strategies aligned with the conceptual framework, the articles

discussed in the literature review of Section 1, and the new studies published since completing the proposal.

Presentation of the Findings

A multiple case study was the most appropriate method for this research. The population included senior managers from different PM organizations who were represented in the study as P1, P2, and P3. The data collected was from semistructured interviews with study participants and data scanned from a review of company records, which included letters, e-mails, project procedures and manuals, and different reports related to planning, processes and procedures, procurement management, and other PM reports. As anticipated, the reports varied based on individual organizational requirements. The following subsections include further report details.

The data collected and analyzed from the interview and company record provided rich information and contributed to answering the RQ: What strategies do senior managers use to reduce construction cost overruns and schedule delays in Qatar? The bulk of the data for this research came from the three interviews. The insightful data obtained from the three cases was enough to achieve data saturation when themes began to recur and no new information emerged from interviews and recorded documents. I used member checking and methodological triangulation as recommended by O'Reilly and Parker (2013) for achieving data saturation in qualitative research.

Data analysis included reading my interpretation to the interviews to establish a correct understanding of strategies employed by the study participants. I identified potential concepts after repetitive inspection of the interview data and the scanned

documents collected from the record. The triangulation process in the study included validating the answers given by the study participants against the secondary sources of information. The identified secondary data presented by participants were in concurrence with the answers to the interview questions as elaborated in the subsections of the identified themes. The data inspection process contributed to developing a summary of the experience shared by the participants. After thorough review and analysis of the collected data, seven centralized themes emerged as summarized in Table 1.

Table 1

Summary of Emergent Themes

Theme	Description of Themes	Occurrence by
1	Master planning.	P1, P2, P3
2	Processes and procedures.	P1, P2, P3
3	Managing design stage.	P1, P2, P3
4	Procurement management.	P1, P2, P3
5	Use of proper software.	P1, P2, P3
6	Realistic project cost and time.	P1, P2, P3
7	Clear scope.	P1, P2, P3
8	Risk management plan.	P1, P2
9	Project brief.	P1, P3
10	Construction plan and methodology.	P2, P3
11	Value engineering and cost cutting.	P1, P3
12	Up-scaling marketplace.	P1
13	Time allowed for the tender stage.	P2
14	Having team responsibility matrix.	P1
15	Train clients, consultants, and contractors.	P1
16	Monitoring the progress and deliverables.	P2

The following subsections include comparisons of the main themes with the conceptual framework, the articles discussed in the literature review of Section 1, and the

new studies published since completing the proposal. The seven centralized themes emerged from each of the three case studies.

Theme 1: The Essence of Planning and Having a Master Program

Planning and developing a project master program was the first central theme according to the three study participants. Fayol highlighted in 1916 that the main function of management started with planning (as cited in Northouse, 2013). Project planning and control is an effective project success factor for any project (Turner & Zolin, 2012). In the planning phase, the project manager sets the project cost and time, estimates resources, and plans for the budget to fund the project. P1 highlighted that the senior manager must have a clear plan in the master program from the project inception stage until project completion. P1 demonstrated in the case study archival documents a PMP he issued to the client at project initiation stage. P2 addressed the need to have the right planning team to make an accurate project plan that has less probability of including incorrect data. P2 demonstrated in a staff deployment document a specific requirement for the planning team to ensure a high level of capability and competency. P3 addressed the need to have a master program for all stages of the project lifecycle, starting from the conceptual stage to design, tendering, construction, and project handover and closeout. P3 shared a master planning initiated during the conceptual phase of the case study. The document included a breakdown of the project plan for all stages of the project lifecycle.

Findings for the planning theme confirm earlier studies highlighted in the literature review. AlSehaimi et al. (2013) selected studies regarding cost overruns and schedule delays and found that 87% identified poor planning. The lack of planning by

clients resulted in cost overruns and schedule delays in construction projects (Amoatey et al., 2015; Choudhry et al., 2014; Harding, 2012). The project planning is a critical factor that has a significant effect on the project cost performance, where the contractor and the client share the responsibility to plan for appropriate construction methods (Doloi, 2013). Applying better planning could bring about productivity improvements in the construction process (Kenley, 2014).

The findings of this study also supported studies published since writing the proposal. Poor scheduling causes delays and cost overruns (Abu El-Maaty, El-Kholy, & Akal, 2017; Adam, Josephson, & Lindahl, 2017; Al-Hazim, Abu Salem, & Ahmed, 2017; Gebrehiwet & Luo, 2017; Renuka, Kamal, & Umarani, 2017; Sambasivan, Deepak, Salim, & Ponniah, 2017). Appropriate project planning is the most important task to reduce schedule delays in construction (Agyekum-Mensah & Knight, 2017; Rama, Sathya, Shasikala, & Clifa, 2017).

This theme connects to PM theory. Exercising the planning process is an important strategy to reduce cost overrun and schedule delays (PMI, 2013). Figure 1 includes details of the planning process group elaborated by PMI for the benefit of senior managers.

Theme 2: Implementing Clear Project Processes and Procedures

Implementing project processes and procedures emerged as a central theme from the three study participants. The project manager establishes the processes and procedures at the planning stage (PMI, 2013). P1 highlighted the need for having systematic processes and procedures and demonstrated the strategy by sharing a manual

issued for the kickoff meeting with the client and other stakeholders. P2 shared a copy of the applied preapproved PM manual that includes defined processes and procedures for each stage of the project lifecycle. P3 highlighted the need for systematic work by implementing detailed processes and procedures for each phase. P3 shared a complete manual of standardized processes and procedures. The manual introduced by P3 included interlink between processes and provided connectivity between each stage of the project lifecycle.

Findings in this theme of implementing processes and procedures confirm strategies highlighted in the literature review. Setting formal processes and procedures is essential for project cost and time control (Doloi, 2013). The inclusion of systematic process reduces the project risks, improves the team performance, and enhances the satisfaction of the stakeholders (Lappe & Spang, 2014). Poor application of quality management systems in the developing countries causes design revisions and construction reworks, which contribute to cost overruns and schedule delays (Alinaitwe et al., 2013). Senior managers need to equip themselves with the essential knowledge and communication skills for successful implementation of the PM process and practices (Kissi et al., 2014).

This finding also confirms the studies published since writing the proposal. Poor processes and procedures is one of the main problems causing delays and cost overruns (Adam et al., 2017). PM processes and procedures improve the use of resources (Nazarko, 2017). A systematic approach reduces delays in construction (Hadidi, Assaf, & Alkhiami, 2017). This theme of implementing processes and procedures connects to the

PM theory as well. PMI developed and distributed the PMBOK, which included several management areas in identified PM processes (PMI, 2013). Figure 1 includes details of the PM process as illustrated by PMI.

Theme 3: Managing and Completing Design Stage Before Construction

Managing the project design stage was a central theme that emerged from the three study participants' interviews. Approximately 73% of construction professionals believe that design management is essential to ensure timely and quality design within the specified budget (Elmualim & Gilder, 2014). P1 highlighted the need to manage the design stage by having different design gateways to adhere to and affirm the design brief. P1 shared three documents that addressed the client approval to three design gateways that were concept design, schematic design, and detailed design. P2 emphasized the need to do thorough design review without any rush in order to avoid mistakes and transfer the drawings and specifications to tender documents with no errors. P2 shared the design review process that included details of the staff deployed for design review to ensure accuracy. P3 highlighted the need to complete designing the project during the design stage to avoid client changes during construction. P3 shared a design guideline document provided for the designer. The design guideline included the project constraints to reduce the risk of a redesign.

Poor management of client requirements at the design stage and lack of integrating the design of project systems are contributing factors to cost overruns and schedule delays (Abdul Rahman et al., 2013; Jallow et al., 2014). Lack of understanding of design requirements of authorities and end-users creates rework and consequent cost

overruns and schedule delays (Alinaitwe et al., 2013). Poor design coordination is a major contributing factor to cost overruns and schedule delays of construction projects in Qatar (Jarkas & Younes, 2014; Memon & Abdul Rahman, 2014; Syed Jamaluddin et al., 2014). Contributing factors to cost overruns and delays in GCC countries are related to client related reworks, poor design coordination, and lack of clarity of the drawings and specifications (Al-Sabah et al., 2014; Jarkas & Younes, 2014). Design problems factor is the most contributing factor to costs overrun and schedule delays (Polat et al., 2014).

Variation orders resulting from design mistakes increase the project time and cost (Al-Hazim et al., 2017). Design problems and errors are causes of cost and time overruns (Abu El-Maaty et al., 2017; Agyekum-Mensah & Knight, 2017). According to Hemal, Waidyasekara, and Ekanayake (2017), design changes cause 78% of cost escalation. The design change has a direct impact on the project cost and time (Famiyeh, Amoatey, Adaku, & Agbenohevi, 2017; Mpofu, Ochieng, Moobela, & Pretorius, 2017; Yap, Abdul-Rahman, & Chen, 2017). Mistakes and poor design documents presented by designers create changes during construction, which cause cost overruns and schedule delays (Gebrehiwet & Luo, 2017; Niazi & Painting, 2017). Design errors and changes are major causes of reworks (Sambasivan et al., 2017). Selecting the right consultant minimizes design changes, improves design documentation, and reduces cost overrun and schedule delays (Hemal et al., 2017).

This theme of managing the design stage ties to the PM theory. The executing process group of PMBOK included steps (in the knowledge areas) for executing the work

as illustrated in Figure 1. The monitoring and controlling process group included a similar guideline for monitoring and controlling.

Theme 4: Procurement Management

Procurement management was a central theme emerged according to the three study participants. Procurement management includes procurement planning, procurement execution, procurement control, and procurement closeout (PMI, 2013). In procurement management, the manager is to collect the procurement requirements and management decisions, find alternative traders, decide the seller, and formalize agreement (PMI, 2013).

P1 highlighted the need to set a clear tendering procurement plan through all stages of the project lifecycle and make the right consultants and contractors selection criteria. P1 shared the project execution plan that included the procurement management steps. In procurement management, P1 reiterated the need to make the right choice with consideration to several requirements instead of putting prices at the top of decision-making criteria. P2 highlighted the essence of setting a procurement strategy and addressed a mechanism for procurement management. In the shared documents, P2 demonstrated the prequalification process for contractors and consultants to establish a PVL and updated it on a quarterly basis. P2 applied a technical and financial scoring system for the selection criteria. P3 highlighted the need for extra care for deciding the number of design and construction packages and consider lessons learned while setting the selection criteria for contractors and consultants. P3 shared a report addressed to the

client for best practice of procuring design and construction packages, including vendors selection criteria.

Findings of this procurement management theme confirm earlier studies highlighted in the literature review. Selecting the lowest bid affects the decision and action of the cost estimator who may underestimate the cost at tender stage (Dominic & Smith, 2014). AlSehaimi et al. (2013) selected earlier studies regarding cost overruns and schedule delays and found that 69% of the cases identified poor procurement as one of the problems. Top contractor related factors causing cost overruns and schedule delays in GCC countries included poor procurement as one of the significant causes (Ruqaishi & Bashir, 2015). One of five impactful constraints to achieving success in the PM practices is the poor understanding of procurement practices (Kissi et al., 2014).

Findings tie to the studies published since writing the proposal. The selection criteria for consultants and contractors have a direct impact on the project (Mpofu et al., 2017). The wrong selection of consultants or contractors contributes to cost overruns and schedule delays (Famiyeh et al., 2017; Gebrehiwet & Luo, 2017; Sambasivan et al., 2017). The senior manager set the right selection criteria for the consultant to reduce cost overrun and schedule delays (Hemal et al., 2017). Findings of this identified theme tie to the PM theory that included the procurement management as one of the essential knowledge areas addressed in the PMBOK as illustrated in figure 1.

Theme 5: Using Appropriate Software

Using appropriate software was a central theme emerged according to the data collected from three study participants. The use of construction related software is a

common practice. P1 highlighted the construction industry is in need to apply management software and other management soft kits to standardize processes and procedures and to provide economical solutions in construction. P1 shared documents included the use of ACONEX for document controlling purposes, and BIM for reducing cost overrun and schedule delays by providing a coordinated design with discrepancies detecting features in the software. P2 highlighted the use of technical software as essentials to succeed in reducing cost overrun and schedule delays. P2 demonstrated through the case study reports the use of EDRMS or BIM for complex projects. P2 stated that the use of PM software is beneficial to the construction industry for better design coordination and enhances communication. P3 in his shared letters demonstrated his argument to use proper software for design integration and coordination, and for staff communication and coordination, such as BIM and ACONEX.

Findings in this theme confirm earlier studies highlighted in the literature review. BIM is an open data tool that designers and PM consultants use to minimize errors and underestimations (Elmualim & Gilder, 2014). BIM provides timely solutions to the design of construction projects, particularly but not limited to large projects (Lu et al., 2013).

The use of software in business management improves the decision-making process (Mendes et al., 2017). Soft modules are useful for enterprise resource planning and provide cost-effective solutions (Hadidi et al., 2017). BIM model provides easy access to the design, clash detection features, improved schedule planning, faster construction packaging process, and cost-effective solutions (Isaac, Curreli, & Stoliar,

2017). The use of BIM eases the access to design details and provides value to the design documents and details in construction (Beazley, Heffernan, & McCarthy, 2017).

Findings tie to the PM theory that included the use of soft PM information system as a support to enhance project success (PMI, 2013).

Theme 6: Setting Project Cost and Time

Setting project cost and time was a central theme emerged according to the data collected from three study participants. Deciding cost and time of any project is essential at the early stage before starting the execution phase (PMI, 2013). P1 highlighted the need to have logical project budget and schedule and avoid underestimation. P1 shared a report that includes a comparison to what the client wants verse needs and feedback of different project stakeholders for project cost and time estimate. P2 stated that a project could not succeed without understanding the market situation and have realistic cost and time for completion. P2 shared a report that included a recommendation to revise the project cost and time to be more realistic in accordance with the market performance. P3 shared a document that contained a budget breakdown provided by P3 to the client to substantiate details of the design and construction costs. P3 intended to justify an argument to the client to prove the cost elements missed by the client at the planning stage.

Findings in this theme of setting realistic cost and time confirm earlier studies highlighted in the literature review. The lack of appropriate budget planning by clients results in cost overruns and schedule delays in construction projects (Amoatey et al., 2015; Choudhry et al., 2014; Harding, 2012). Many developers in the construction

industry consider the early stage cost estimate as a critical phase in the project (Jin et al., 2014). Preliminary cost estimates need extra care because a lot of details and information are uncertain or unavailable at the project inception stage (Dominic & Smith, 2014). Approximately 37% of the assumptions made at earlier stages of the project lifecycle are invalid and have effects on the project process, which may create an extra cost of materials and delays caused by rework (Gao et al., 2014). Cost estimators may forecast underestimated budget for large projects because they may exclude factors such as inflation and other provisional costs related to social and environmental issues, which causes cost overruns to around 75% of large-scale developments (Ansar et al., 2014). Engaging players such as the client, financial representative, land surveyor and geotechnical experts, materials engineers, and suppliers in the estimation process is helpful to improve the whole project cost estimation (Ochieng et al., 2015).

Poor estimation to project cost and time has a severe impact on cost overruns and schedule delays (Abu El-Maaty et al., 2017; Adam et al., 2017; Famiyeh et al., 2017; Gebrehiwet & Luo, 2017; Mpofu et al., 2017). According to Ko and Han (2017), an accurate budget plan is essential at project early stage to avoid cost overrun and construction disruption. The project manager needs to plan realistic project duration and cost to mitigate overruns and delays (Al-Hazim et al., 2017). Findings tie to the PM theory. Project time management and cost management include estimating these two elements of the knowledge areas as essential parts of the PM process groups (PMI, 2013).

Theme 7: Setting Clear Scope

Setting clear scope was a central theme emerged according to the data collected from three study participants. Project scope management is one of the ten knowledge areas identified in the PMBOK (PMI, 2013). The project manager takes the information from the stakeholders, defines the work scope, divide it into elements, and control the scope changes to avoid cost overrun and schedule delays (PMI, 2013). P1 and P2 highlighted standardizing and making clear scope and contract conditions for particular services or works related to the project consultants and contractors. P1 and P2 shared a manual that includes general and specific scope statement and contract conditions for each work or service provided by the project consultants and contractors. P3 elaborated to the need for listing deliverables for each stage of the defined scope within every phase of the project lifecycle. P3 demonstrated a report sent to the client for addressing list of scope and deliverables for each stage of each vendor.

One of the internal risks of most significant effect on project cost and time performance in GCC countries is related to an unclear definition of the scope (Al-Sabah et al., 2014). The poor and unclear scope statement stipulated in the consultants and contractors contract is a leading cause to project failure factors, particularly cost overruns and schedule delays (Cheng, 2014; Harding, 2012). Senior managers need to conduct a cost-benefit analysis before deciding on scope changes (Singhania, 2013). The variations from the client side exist in the form of scope changes and CRR during the construction stage. Succeeding to interpret the project brief at early planning and design stages could eliminate the need for rework during construction, which contributes to reducing cost

overruns and schedule delays (Collinge & Harty, 2014). Contractors in Taiwan won 61% out of 79 litigation delay cases against the clients because the delays were mainly created by the clients who changed the scope and order of work (Yang et al., 2013).

Poor definition of project scope and related contract conditions causes additional cost and time to the project (Abu El-Maaty et al., 2017; Famiyeh et al., 2017). Brief ambiguities and poor definitions with mistakes and discrepancies in the contract conditions create the need to scope changes and rework during design or construction stages (Gebrehiwet & Luo, 2017; Sambasivan et al., 2017). Scope changes have a negative impact on project cost and time (Agyekum-Mensah & Knight, 2017; Mpofu et al., 2017). Findings tie to the PM theory. Project scope management is an essential knowledge area within the PM process groups identified in PMBOK as illustrated in figure 1.

Applications to Professional Practice

This research was an exploration of strategies three senior managers of different PM organizations used to reduce cost overrun and schedule delays in construction. The economic growth of Qatar depends on the success of the construction industry similarly to all Arabian Gulf countries, Ghana, Malaysia, and Singapore (Al-Sabah et al., 2014; Jaeger & Adair, 2013; Jarkas & Haupt, 2015; Jarkas et al., 2014; Jarkas & Younes, 2014). Cost overruns and project delays have a severe effect on the economy of GCC countries (Ruqaishi & Bashir, 2015). The findings of this study included main centralized themes that might be the industry best practice in construction in Qatar. The findings

could help senior managers of other organizations to reduce cost overruns and schedule delays.

Producing a master plan advised by P1, P2, and P3 might help to avoid planning related problems that affect development cost and time because according to the study of AlSehaimi et al., (2013), 87% of budget overruns and delays cases included identification to poor planning. According to the study participants, having defined processes and procedures contributes to reducing budget escalation and delays that senior manager might experience in construction projects (Adam et al., 2017; Doloi, 2013). The design management strategy implemented by the study participants might be useful for other senior managers because poor control to design stage contributes to cost overrun and schedule delays (Jarkas & Younes, 2014; Memon & Abdul Rahman, 2014; Syed Jamaluddin et al., 2014).

The right procurement and selection criteria made by the study participants could lead senior managers to set appropriate appointment process for the consultants and contractors to avoid cost and time impacts (Famiyeh et al., 2017; Gebrehiwet & Luo, 2017; Kissi et al., 2014; Sambasivan et al., 2017). P2 stated there was a significant value when having a preferred vendors list (PVL) ready before tendering and update that list twice a year. P2 highlighted that a PVL contributes to saving the time needed for prequalification exercise. The use of software like BIM is meaningful for development and construction organizations to reduce overruns because BIM is useful to avoid problems related to the quality of design and related impact on project budget (Elmualim & Gilder, 2014; Isaac et al., 2017). The participants advised making a detailed market

study before forecasting the project budget and duration. Such strategy is useful for senior managers because unrealistic estimate to time and cost has a significant effect to overruns (Abu El-Maaty et al., 2017; Adam et al., 2017; Amoatey et al., 2015; Choudhry et al., 2014; Harding, 2012). Clear scope and contract conditions advised by the study participants is a meaningful strategy to reduce scope changes and consequent overruns (Abu El-Maaty et al., 2017; Cheng, 2014; Famiyeh et al., 2017; Harding, 2012).

Implications for Social Change

The objective of this qualitative multiple case study was to explore strategies senior managers use to reduce cost overruns and schedule delays. The findings of the study could be useful to senior managers as a sustainability strategy for the short and long terms, which contributes to maintaining a clean Earth. Managers in construction could use the results from my study to recognize how rework results in the waste creation that affects the environment. The findings, conclusions, and recommendations of this study provide information to reduce costs to customers and to attenuate environmental impacts and improve the quality of living (Kozlovska & Spisakova, 2013). Schedule delay affects the profits of the client and the contractor and creates conflict between the two parties (Yang, Chu, & Huang, 2013). Such disputes might affect the senior managers and their employees. Reducing overruns helps in the reduction of cost of developments. Low cost of construction projects provides more opportunities for communities to have their properties at lower prices.

Planning strategy might be useful to make positive social change by having planned and organized life. Applying processes and procedures is helpful for

standardizing the workflow in life. The strategy of using software might be meaningful for positive social change when thinking innovation. Deciding a realistic cost for any plan might reduce the risk of overrun and related stress. Researchers could use the findings to understand different strategies used to improve the performance of property development business.

Recommendations for Action

The results presented in this study introduce lessons to senior managers in the construction industry for reducing cost overruns and schedule delays in property development projects. The senior managers in construction have a significant role in improving project cost and time by following the following recommendations:

1. Communicate the benefits of the study findings to different levels of their organizations to comprehend the advantages.
2. Examine the benefits of PMBOK as it contains all processes and knowledge areas addressed by the participants. PMBOK includes more processes and knowledge areas not defined by the participants.
3. Establish a systematic approach to apply the strategies stated in the study findings by having standardized processes and procedures.
4. Set an internal auditing system to monitor the application by middle and junior managers to the processes and procedures.
5. Do an annual update to latest strategies used by senior managers of leading PM consultants, then start again from the first point addressed above.

The themes found in the study support these five recommendations. The study findings might be helpful for senior managers and their employees. I will forward a finding summary to all participants and their organizations. I will disseminate the study findings to more audience in construction either by visiting companies, conducting a public conference, or through electronic communications.

Recommendations for Further Research

The purpose of this qualitative multiple case study was to explore strategies senior managers use to reduce cost overruns and schedule delays in construction. The findings of this research validate earlier and current literature. One limitation identified in this qualitative multiple case study was the small sample size of three senior managers whereas access to participants was reasonable. The number of participating companies can be more than three, and the sample size for each organization can be more than one senior manager to verify and validate if all senior managers share the same strategies in a systematic method. Conducting single case studies might be another useful approach to explore insightful details of techniques used by senior managers.

Another limitation was the need to conclude unbiased results that depend on the accuracy of information provided by the participants. Letter of cooperation was helpful to provide a high level of comfortability for the study participants when providing the required information in an unbiased way. A quantitative study might be useful to support the identified reasons affecting cost overrun and schedule delays and assess relationships between variables, which may help future researchers who intend to conduct qualitative

research. Researchers may expand to further parts in GCC countries to confirm or disconfirm generalizing the study findings in GCC.

Reflections

This research was my first study at the doctoral level. I was not aware of any required level of details for a doctoral study prior beginning the program. The doctoral study is more detailed, systematic, aligned, and insightful than I expected. The flow of the research and level of integrity between sections of the paper template were helpful to shift my way of thinking when conducting an academic study and in communicating with business leaders and senior managers. Some delays occurred in the interviews because of the schedule made by the participants. There was some difficulty in obtaining the archival documents of the case studies as a secondary source of data because of the time participants took to collect the desired record. The identified difficulty was due to the need for determining the location of these past documents since the senior manager completed and closed the project. With the letter of cooperation provided by the three organizations, the participants were comfortable and well engaged during the interviews. I used the information and data provided by the senior managers during interviews and secondary data sources to base my findings upon in an effort to remain unbiased.

Most of the themes were as I had anticipated. I found new themes that I did not think of in my earlier projects, which are positive lessons for my career development. One big lesson I learned in this doctoral study is that social change can have a significant effect on business sustainability. Findings from this study improved my knowledge in business administration and construction PM. The identified themes are informative for

senior managers who are suffering cost overruns and schedule delays and looking for the effective strategies.

Conclusion

The purpose of this qualitative multiple case study was to explore the strategies senior managers use to reduce cost overruns and schedule delays. The study has meaningful values for senior managers in construction. Reducing cost overruns and schedule delays is a helpful approach to improve the performance of construction project businesses and enhance the lives of people. Cost and time control is a project performance indicator. Identifying and assessing the causes to cost and time overruns enable senior construction leaders to solve and control the problem to maintain business sustainability in the short and long terms. Senior managers could improve their business sustainability by adhering to latest strategies published in the literature and findings of this study.

The study findings included 16 themes. Seven themes are major centralized themes whereas the other nine were minor. The central themes were (a) planning, (b) processes and procedures, (c) managing design stage, (d) procurement management, (e) use of software, (f) setting project cost and time, and (g) deciding clear scope. Minor themes were (1) risk management, (2) project brief, (3) construction methodology, (4) value engineering, (5) up-scaling marketplace, (6) time for tendering, (7) responsibility matrix, (8) training, and (9) monitoring the progress. The findings of the study aligned with the literature, the current studies, and the conceptual framework.

Senior leaders need to improve the awareness of their management team at all levels to have a common shared vision, values, and strategy in adopting the industry best practices. Engaging the management teams in PM related courses might contribute to improving awareness and skills. Periodical business performance assessment is helpful to monitor and control systematic approach to applying the identified strategies.

References

Abdul Aziz, A. A., Memon, A. H., Abdul Rahman, I., & Karim, A. T. A. (2013). Controlling cost overrun factors in construction projects in Malaysia. *Research Journal of Applied Sciences, Engineering and Technology, 5*, 2621-2629. Retrieved from http://www.maxwellsci.com

Abdul Rahman, I., Memon, A. H., & Karim, A. T. A. (2013). Significant factors causing cost overruns in large construction projects in Malaysia. *Journal of Applied Sciences, 13*, 286-293. doi:10.3923/jas.2013.286.293

Abu El-Maaty, A. E., El-Kholy, A. M., & Akal, A. Y. (2017). Modeling scheduling overrun and cost escalation percentages of highway projects using fuzzy approach. *Engineering, Construction and Architectural Management, 24*, 809-827. doi:10.1108/ECAM-03-2016-0084

Acebes, F., Pajares, J., Galan, J. M., & Lopez-Paredes, A. (2014). A new approach for project control under uncertainty. Going back to the basics. *International Journal of Project Management, 32*, 423-434. doi:10.1016/j.ijproman.2013.08.003

Adam, A., Josephson, P.-E. B., & Lindahl, G. (2017). Aggregation of factors causing cost overruns and time delays in large public construction projects. *Engineering, Construction and Architectural Management, 24*, 393-406. doi:10.1108/ECAM-09-2015-0135

Agyekum-Mensah, G., & Knight, A. D. (2017). The professionals' perspective on the causes of project delay in the construction industry. *Engineering, Construction and Architectural Management, 24*, 828-841. doi:10.1108/ECAM-03-2016-0085

Ahiaga-Dagbui, D. D., & Smith, S. D. (2014). Dealing with construction cost overruns using data mining. *Construction Management and Economics, 32,* 682-694. doi:10.1081/01446193.2014.933854

Aiyetan, O. A. (2014). Rework cost on building projects in the south western part of Nigeria. *Journal of Construction Project Management and Innovation, 4,* 755-769. Retrieved from https://www.sabinet.co.za/

Al-Hajj, A., & Hamani, K. (2011). Material waste in the UAE construction industry: Main causes and minimization practices. *Architectural Engineering and Design Management, 7,* 221-235. doi:10.1080/17452007.2011.594576

Al-Hazim, N., Abu Salem, Z., & Ahmed, H. (2017). Delay and cost overrun in infrastructure projects in Jordan. *Procedia Engineering, 182,* 18-24. doi:10.1016/j.proeng.2017.03.105

Al Haj, R. A., & El-Sayegh, S. M. (2015). Time-cost optimization model considering float-consumption impact. *Journal of Construction Engineering and Management, 141*(5), 1-10. doi:10.1061/(ASCE)CO.1943-7862.0000966

Alinaitwe, H., Apolot, R., & Tindiwensi, D. (2013). Investigation into the causes of delays and cost overruns in Uganda's public sector construction projects. *Journal of Construction in Developing Countries, 18*(2), 33-47. Retrieved from http://web.usm.my/jcdc

Aliverdi, R., Naeni, L. M., & Salehipour, A. (2013). Monitoring project duration and cost in a construction project by applying statistical quality control charts.

International Journal of Project Management, 31, 411-423. doi:10.1016/j.ijproman.2012.08.005

Allen, M., Alleyne, D., Farmer, C., McRae, A, & Turner, C. (2014). A framework for project success. *Journal of Information Technology and Economic Development, 5*, 1-17. Retrieved from https://www.ebscohost.com/

Al-Sabah, R., Menassa, C. C., & Hanna, A. (2014). Evaluating impact of construction risks in the Arabian Gulf Region from perspective of multinational architecture, engineering and construction firms. *Construction Management and Economics, 32*, 382-402. doi:10.1080/01446193.2014.884281

AlSehaimi, A., Koskela, L., & Tzortzopoulos, P. (2013). Need for alternative research approaches in construction management: Case of delay studies. *Journal of Management in Engineering, 29*, 407-413. doi:10.1061/(ASCE)CO.1943-5479.0000148

Ameh, O. J., & Itodo, D. E. (2013). Professionals' views of material wastage on construction sites and cost overruns. *Organization, Technology & Management in Construction: An International Journal, 5*, 747-757. doi:10.5592/otmcj.2013.1.11

Amoatey, C. T., Ameyaw, Y. A., Adaku, E., & Famiyeh, S. (2015). Analysing delay causes and effects in Ghanaian state housing construction projects. *International Journal of Managing Projects in Business, 8*(1), 198-214. doi:10.1109/IJMPB-04-2014-0035

Ansar, A., Flyvbjerg, B., Budzier, A., & Lunn, D. (2014). Should we build more large dams? The actual costs of hydropower megaprojects development. *Energy Policy, 69*, 43-56. doi:10.1016/j.enpol.2013.10.069

Arashpour, M., Wakefield, R., Blismas, N., & Lee, E. W. M. (2014). Analysis of disruptions caused by construction field rework on productivity in residential projects. *Journal of Construction Engineering and Management, 140*(2), 1-12. doi:10.1061/(ASCE)CO.1943-7862.0000804

Archibald, M. M. (2015). Investigator triangulation: A collaborative strategy with potential for mixed methods research. *Journal of Mixed Methods Research, 10,* 228-250. doi:10.1177/1558689815570092

Ardhendu, S. S. (2014). Conducting case study research in non-profit organisations. *Qualitative Market Research, 17*, 77-84. doi:10.1108/QMR-04-2013-0024

Aravamudhan, N. R., & Krishnaveni, R. (2015). Establishing and reporting content validity evidence of training and development capacity building scale (TDCBS). *Management Journal of Contemporary Management Issues, 20*(1), 131-158. Retrieved from http://hrcak.srce.hr/management

Azman, M. A., Abdul-Samad, Z., & Ismail, S. (2013). The accuracy of preliminary cost estimates in Public Works Department (PWD) of Peninsular Malaysia. *International Journal of Project Management, 31*, 994-1005. doi:10.1016/j.ijproman.2012.11.008

Ballesteros-Perez, P., del Campo-Hitschfeld, M. L., Gonzalez-Naranjo, M. A., & Gonzalez-Cruz, M. C. (2015). Climate and construction delays: Case study in

Chile. *Engineering, Construction and Architectural Management, 22,* 596-621. doi:10.1108/ECAM-02-2015-0024

Barnham, C. (2015). Quantitative and qualitative research. *International Journal of Marketing Research, 57,* 837-854. doi:10.2501/IJMR-2015-070

Barnwell, D. (2015). *Strategies to overcome barriers to a more effective leadership style* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (UMI No. 3740703)

Beazley, S., Heffernan, E., & McCarthy, T. J. (2017). Enhancing energy efficiency in residential buildings through the use of BIM: The case for embedding parameters during design. *Energy Procedia, 121,* 57-64. doi:10.1016/j.egypro.2017.07.479

Bendassolli, P. F. (2013). Theory building in qualitative research: Reconsidering the problem of induction. *Forum: Qualitative Social Research, 14*(1), 5-12. Retrievedfrom http://nbn-resolving.de/urn:nbn:de:0114-fqs1301258

Berger, R. (2015). Now I see it, now I don't: Researcher's position and reflexivity in qualitative research. *Qualitative Research, 15,* 219-234. doi:10.1177/1468794112468475

Bernard, H. R. (2013). *Social research methods: Qualitative and quantitative approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Bird, W. A., Martin, M. J., Tummons, J. D. & Ball, A. L. (2013). Engaging students in constructive youth-adult relationships: A case study of urban school-based agriculture students and positive adult mentors. *Journal of Agricultural Education, 54*(2), 29-43. doi:10.5032/jae.2013.02029

Boyd, W. E., Parry, S., Burger, N., Kelly, J., Boyd, W., & Smith, J. (2013). Writing for ethical research: Novice researchers, writing, and the experience of experiential narrative. *Creative Education, 4*(12), 30-39. doi:10.4236/ce.2013.412a1005

Bryce, H. A. (2013). Exploring the use of grounded theory as a methodological approach to examine the 'black box' of network leadership in the National Quality Forum. *Journal of Health & Human Services Administration, 35*, 469-504. Retrieved from http://www.spaef.com/jhhsa.php

Brysiewicz, P., & Erlingsson, C. (2013). Orientation among multiple truths: An introduction to qualitative research. *African Journal of Emergency Medicine, 3*(2), 92-99. doi:10.1016/j.afjem.2012.04.005

Burchett, H. E., Mayhew, S. H., Lavis, J. N., & Dobrow, M. J. (2013). When can research from one setting be useful in another? Understanding perceptions of the applicability and transferability of research. *Health Promotion International, 28*, 418-430. doi:10.1093/heapro/das026

Bustamante, C., & Moeller, A. J. (2013). Exploring the unique case of a professional development program on web 2.0 technologies for teachers of German. *CALICO Journal, 30*(1), 82-104. doi:10.11139/cj.30.1.82-104

Carrillo, P., Ruikar, K., & Fullar, P. (2013). When will we learn? Improving lessons learned practice in construction. *International Journal of Project Management, 31*, 567-578. doi:10.1016/j.ijproman.2012.10.005

Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A., J. (2014). The use of triangulation in qualitative research. *Oncology Nursing Forum, 41*, 545-

547. doi:10.1188/14.ONF.545.547

Castleberry, A. (2014). NVivo 10 [software program]. Version 10. QSR International; 2012. *American Journal of Pharmaceutical Education, 78*, 25. doi:10.5688/ajpe78125

Chan, C., Fung, Y. L., & Chien, W. T. (2013). Bracketing in phenomenology: Only undertaken in the data collection and analysis process. *The Qualitative Report, 18*, 1-9. Retrieved from http://www.nova.edu/ssss/QR/

Check, D. K., Wolf, L. E., Dame, L. A., & Beskow, L. M. (2014). Certificates of confidentiality and informed consent: Perspectives of IRB chairs and institutional legal counsel. *IRB: Ethics and Human Research, 36*(1), 1-8. doi:10.1038/gim.2014.102

Cheng, Y.-M. (2014). An exploration into cost-influencing factors on construction projects. *International Journal of Project Management, 32*, 850-860. doi:10.1016/j.ijproman.2013.10.003

Chen, P., & Partington, D. (2006). Three conceptual levels of construction project management work. *International Journal of Project Management, 24*, 412-421. doi:10.1016/j.ijproman.2006.02.009

Chou, J.-S., Irawan, N., & Pham, A.-D. (2013). Project management knowledge of construction professionals: Cross-country study of effects on project success. *Journal of Construction Engineering and Management, 139*(11), 1-15. doi:10.1061/(ASCE)CO.1943-7862.0000766

Cho, K, & Hastak, M. (2013). Time and cost-optimized decision support model for fast-

track projects. *Journal of Construction Engineering and Management, 139*(1), 90-101. doi:10.1061/(ASCE)CO.1943-7862.0000570

Choudhry, R. M., Aslam, M. A., Hinze, J. W., & Arain, F. M. (2014). Cost and schedule risk analysis of bridge construction in Pakistan: Establishing risk guidelines. *Journal of Construction Engineering and Management, 140*(7), 1-9. doi:10.1061/(ASCE)CO.1943-7862.0000857

Cleary, M., Horsfall, J., & Hayter, M. (2014). Data collection and sampling in qualitative research: Does size matter? *Journal of Advanced Nursing*, *70*, 473-475. doi:10.1111/jan.12163

Collins, C. S., & Cooper, J. E. (2014). Emotional intelligence and the qualitative researcher. *International Journal of Qualitative Methods, 13*, 88-103. Retrieved from http://ejournals.library.ualberta.ca/index.php/IJQM/index

Collinge, W. H., & Harty, C. F. (2014). Stakeholder interpretations of design: Semiotic insights into the briefing process. *Construction Management and Economics, 32*, 760-772. doi:10.1080/01446193.2014.894247

Cronin, C. (2014). Using case study research as a rigorous form of inquiry. *Nurse Researcher*, *21*(5), 19-27. doi:10.7748/nr.21.5.19.e1240

Crowe, M., Inder, M., & Porter, R. (2015). Conducting qualitative research in mental health: Thematic and content analyses. *Australian & New Zealand Journal of Psychiatry*. Advance online publication. doi:10.1177/0004867415582053

Cseko, G., & Tremaine, W. (2013). The role of the Institutional Review Board in the oversight of the ethical aspects of human studies research. *Nutrition in Clinical Practice, 28,* 177-181. doi:10.1177/0884533612474042

Cunliffe, A. L., & Karunanayake, G. (2013). Working within hyphen-spaces in ethnographic research: Implications for research identities and practice. *Organizational Research Methods, 169,* 364-392. doi:10.1177/1094428113489353

Dangal, M. R. (2012). Zooming on the qualitative paradigm in management and development research: An experience during PhD thesis writing. *Administration and Management Review, 2,* 1-23. Retrieved from http://www.nepjol.info/index.php/AMR

Davidson, A. S. (2013). Phenomenological approaches in psychology and health sciences. *Qualitative Research in Psychology, 10,* 318-339. doi:10.1080/14780887.2011.608466

Denzin, N. K., & Lincoln, Y. S. (2011). *The Sage handbook of qualitative research* (4th ed.). Thousand Oaks, CA: Sage.

Dogbegah, R., Omoteso, K., & Owusu-Manu, D. (2013). A qual-quant (Q^2) method for exploring and appraising project management competency requirements for managing large projects in Ghana. *International Journal of Construction Project Management, 5,* 135-158. Retrieved from https://www.novapublishers.com

Dolnicar, S. (2013). Asking good survey questions. *Journal of Travel Research, 52,* 551-574. doi:10.1177/0047287513479842

Doloi, H. (2013). Cost overruns and failure in project management: Understanding the roles of key stakeholders in construction projects. *Journal of Construction Engineering and Management, 139*(3), 267-279. doi:10.1061/(ASCE)CO.1943-7862.0000621

Dominic, A.-D. D., & Smith, S. D. (2014). Rethinking construction cost overruns: Cognition, learning and estimation. *Journal of Financial Management of Property and Construction, 19*, 38-54. doi:10.1108/JFMPC-06-2013-0027

Dong, N., Fischer, M., Haddad, Z., & Levitt, R. (2013). A method to automate look-ahead schedule (LAS) generation for the finishing phase of construction projects. *Automation in Construction, 35*, 157-173. doi:10.1016/j.autcon.2013.05.023

Du, J., Liu, R., & Isaa, R. R. A. (2014). BIM cloud score: Benchmarking BIM performance. *Journal of Construction Engineering and Management, 140*(11), 1-13. doi:10.1061/(ASCE)CO.1943-7862.0000891

Effelsberg, D., Solga, M., & Gurt, J. (2014). Transformational leadership and follower's unethical behavior for the benefit of the company: A two-study investigation. *Journal of Business Ethics, 120*, 81-93. doi:10.1007/s10551-013-1644-z

Eizakshiri, F., Chan, P. W., & Emsley, M. W. (2015). Where is intentionality in studying project delays? *International Journal of Managing Projects in Business, 8*, 349-367. doi:10.1108/IJMPB-05-2014-0048

Elmualim, A., & Gilder, J. (2014). BIM: Innovation in design management, influence and challenges of implementation. *Architectural Engineering and Design Management, 10*, 183-199. doi:10.1080/17452007.2013.821399

Emrich, K. J. (2015). *Profitability and the financial strategies of women-owned small businesses* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (UMI No. 3680364)

Engwall, M. (1998). The project concept(s): On the unit of analysis in the study of project management. In R. A. Lundin & C. Midler (Eds.), *Projects as arenas for renewal and learning processes* (pp. 25-35). Boston, MA: Kluwer Academic.

Escamilla, E. F. (2013). A descriptive analysis of project management planning practices for renovation of historical buildings in urban contexts located in Texas. *International Journal of Construction Project Management, 5*, 87-114. Retrieved from https://www.novapublishers.com

Eskerod, P., & Huemann, M. (2013). Sustainable development and project stakeholder management: What standards say. *International Journal of Managing Projects in Business, 6*, 36-50. doi:10.1108/17538371311291017

Famiyeh, S., Amoatey, C. T., Adaku, E., & Agbenohevi, C. S. (2017). Major causes of construction time and cost overruns: A case of selected educational sector projects in Ghana. *Journal of Engineering, Design and Technology, 15*, 181-198. doi:101108/JEDT-11-2015-0075

Fanning, F. E. (2014). Adapting PMBoK guidance to public sector projects. *Organization, Technology and Management in Construction. An International Journal, 6*, 1094-1098. doi:10.5592/otmcj.2014.3.3

Frels, R. K., & Onwuegbuzie, A. J. (2013). Administering quantitative instruments with qualitative interviews: A mixed research approach. *Journal of Counseling &*

Development, 91, 184-194. doi:10.1002/j.1556-6676.2013.00085.x

Fusch, P., & Ness, L. (2015). Are we there yet? Data saturation in qualitative research. *Qualitative Report, 20*, 1408-1416. Retrieved from http://www.nova.edu

Gaddis, P. O. (1959). The project manager. *Harvard Business Review, 73*(3), 89-97. Retrieved from https://hbr.org/

Gannon, W. L. (2014). Integrating research ethics with graduate education in geography. *Journal of Geography in Higher Education, 38,* 481-499. doi:10.1080/03098265.2014.958656

Gao, T., Ergan, S., Akinci, B., & Garrett, J. H. (2014). Proactive productivity management at job sites: Understanding characteristics of assumptions made for construction processes during planning based on case studies and interviews. *Journal of Construction Engineering and Management, 140*(3), 1-11. doi:10.1061/(ASCE)CO.1943-7862.0000816

Garel, G. (2013). A history of project management models: From pre-models to the standard models. *International Journal of Project Management, 13*, 663-669. doi:10.1016/j.ijproman.2012.011

Garson, G. D. (2013). *Ethnographic research.* Asheboro, NC: Statistical Associates Publishers.

Gatt, D., Grech, H., & Dodd, B. (2014). Early expressive vocabulary skills: A multimethod approach to measurement. *First Language, 34*, 136-154. doi:10.1177/0142723714521830

Gebrehiwet, T., & Luo, H. (2017). Analysis of delay impact on construction project

based on RII and correlation coefficient: Empirical study. *Procedia Engineering, 197*, 366-374. doi:10.1016/j.proeng.2017.07.212

Gibson, D., & Gross, J. (2013). Research data management in a collaborative network. *Research Global, 33*, 12-15. Retrieved from http://ro.ecu.edu.au/ecuworks2011/586

Gibson, S., Benson, O., & Brand, S. L. (2012). Talking about suicide: Confidentiality and anonymity in qualitative research. *Nursing Ethics, 20*(1), 18-29. doi:10.1177/0969733012452684

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational Research Methods, 16*(1), 15-31. doi:10.1177/1094428112452151

Gonzalez, G. E. G., Casas, G. H. P., & Coronado, C. A. L. (2013). Project manager profile characterization in the construction sector in Bogota, Colombia. *Project Management Journal, 44*, 68-93. doi:10.1002/pmj.21381

Gray, D. E. (2013). *Doing research in the real world*. Thousand Oaks. CA: Sage.

Green, B. (2013). Narrative inquiry and nursing research. *Qualitative Research Journal, 13*, 62-71. doi:10.1108/14439881311314586

Griffith, D. A. (2013). Establishing qualitative geographic sample size in the presence of spatial autocorrelation. *Annuals of the Association of American Geographers, 103*, 1107-1122. doi:10.1080/00045608.2013.776884

Guetterman, T. C., Fetters, M. D., & Creswell, J. W. (2015). Integrating quantitative and qualitative results in health science mixed methods research through joint

displays. *Annals of Family Medicine, 13,* 554-561. doi:10.1370/afm.1865

Hadidi, L., Assaf, S., & Alkhiami, A. (2017). A systematic approach for ERP implementation in the construction industry. *Journal of Civil Engineering and Management, 23,* 594-603. doi:10.3846/13923730.2016.1215348

Hallback, J. & Gabrielsson, P. (2013). Entrepreneurial marketing strategies during thegrowth of international new ventures originating in small and open economies. *International Business Review, 22,* 1008–1020. doi:10.1016/j.ibusrev.2013.02.006

Hammer, C. S. (2011). Expanding our knowledge base through qualitative research methods. *American Journal of Speech-Language Pathology, 20,* 161-162. doi:10.1044/1058-0360(2011/ed-03)

Harding, J. (2012). Avoiding project failures. *Chemical Engineering, 119*(13), 51-54. Retrieved from http://www.chemengonline.com/

Harper, M. & Cole, P. (2012). Member checking: Can benefits be gained similar to group therapy? *The Qualitative Report, 17,* 510-517. Retrieved from http://www.nova.edu/

Harvey, F. (2014). Values, choices, responsibilities: Thinking beyond the scholarly place of ethics for the GIScience and technology profession and GIScience. *Journal of Geography in Higher Education, 38,* 500-510. doi:10.1080/03098265.2014.956299

Harvey, L. (2015). Beyond member-checking: A dialogic approach to the research interview. *International Journal of Research & Method in Education, 38,* 23-38. doi:10.1080/1743727X.2014.914487

Heale, R., & Forbes, D. (2013). Understanding triangulation in research. *Evidence Based Nursing, 16*(4), 98. doi:10.1136/eb-2013-101494

Hemal, R. M. N., Waidyasekara, K. G. A. S., & Ekanayake, E. M. A. C. (2017). Integrating design freeze in to large-scale construction projects in Sri Lanka. *Moratuwa Engineering Research Conference,* 259-264. doi:10.1109/MERCon.2017.7980492

Henriques, G. (2014). In research of collective experience and meaning: A transcendental phenomenological methodology for organizational research. *Human Studies, 37*,451-468. doi:10.1007/s10746-014-9332-2

Henry, L. (2013). Intellectual capital in a recession: Evidence from UK SMEs. *Journal of Intellectual Capital, 14,* 84-101. doi:10.1108/14691931311289039

Heravi, A., Coffey, V., & Trigunarsyah, B. (2015). Evaluating the level of stakeholder involvement during the project planning processes of building projects. *International Journal of Project Management, 33*, 985-997. doi:10.1016/j.ijproman.2014.12.007

Heravi, G., & Faeghi, S. (2014). Group decision making for stochastic optimization of time, cost, and quality in construction projects. *Journal of Computing in Civil Engineering, 28*, 275-283. doi:10.1061/(ASCE)CP.1943-5487.0000264

Hjelmbrekke, H., Laedre, O., & Lohne, J. (2014). The need for a project governance body. *International Journal of Managing Projects in Business, 7,* 661-677. doi:10.1108/IJMPB-03-2013-0012.

Hossain, M. A., & Chua, D. K. H. (2014). Overlapping design and construction activities

and an optimization approach to minimize rework. *International Journal of Project Management, 32*, 983-994. doi:10.1061/j.ijproman.2013.10.019

Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigour in qualitative case study research. *Nurse Researcher, 20*, 12-17 doi:10.7748/nr2013.03.20.4.12.e326

Hwang, B.-G., Tan, H. F., & Sathish, S. (2013). Capital project performance measurement and benchmarking in Singapore. *Engineering, Construction and Architectural Management, 20*, 143-159. doi:10.1108/09699981311303017

Hwang, B.-O., & Leong, L. P. (2013). Comparison of schedule delay and causal factors between traditional and green construction projects. *Technological and Economic Development of Economy, 19*, 310-330. doi:10.3846/20294913.2013.798596

Hwang, B.-O., & Yang, S. (2014). Rework and schedule performance. A profile of incidence, impact, causes and solutions. *Engineering, Construction and Architectural Management, 21*, 190-204. doi:10.1108/ECAM-10-2012-0101

Hwang, B., Zhao, X., & Goh, K. J. (2014). Investigating the client-related rework in building projects: The case of Singapore. *International Journal of Project Management, 32*, 698-708. doi:10.1016/j.ijproman.2013.08.009

Hyeit, N., Kenny, A., & Dickson-Swift, V. (2014). Methodology or method? A critical review of qualitative case study reports. *International Journal of Qualitative Studies on Health and Well-being, 9*, 23606. doi:10.3402/qhw.v9.23606

Irvine, A., Drew, P., & Sainsbury, R. (2013). Am I not answering your questions properly? Clarification, adequacy and responsiveness in semistructured telephone and face-to-face interviews. *Qualitative Research, 13*, 87-106.

doi:10.1177/1468794112439086

Isaac, S., Curreli, M., & Stoliar, Y. (2017). Work Packaging with BIM. *Automation in Construction, 83*, 121-133. doi:10.1016/j.autcon.2017.08.030

Ishii, N., Takano, Y., & Muraki, M. (2014). An order acceptance strategy under limited engineering man-hours for cost estimation in engineering-procurement-construction projects. *International Journal of Project Management, 32*, 519-528. doi:10.1016/j.ijproman.2013.07.009

Jacob, S. A., & Furgerson, S. P. (2012). Writing interview protocols and conducting interviews: Tips for students new to the field of qualitative research. *Qualitative Report, 17*(42), 1-10. Retrieved from http://www.nova.edu/ssss/QR/index.html

Jaeger, M., & Adair, D. (2013). Cross cultural construction project management in the GCC countries: A local perspective on western project parties. *International Journal of construction Project Management, 5*, 67-83. Retrieved from https://www.novapublishers.com

Jallow, A. K., Demian, P., Baldwin, A. N., & Anumba, C. (2014). An empirical study of the complexity of requirements management in construction projects. *Engineering Construction & Architectural Management, 21*, 505-531. doi:10.1108/ECAM-09-2013-0084

Jarkas, A. M, & Haupt, T. C. (2015). Major construction risk factors considered by general contractors in Qatar. *Journal of Engineering, Design and Technology, 13*(1), 165-194. doi:10.1108/JDET-03-2014-0012

Jarkas, A. M., Radosavljevic, M., & Wuyi, L. (2014). Prominent demotivational factors influencing the productivity of construction project managers in Qatar. *International Journal of Productivity and Performance Management, 63*, 1070-1090. doi:10.1108/IJPPM-11-2013-0187

Jarkas, A. M., & Younes, J. H. (2014). Principle factors contributing to construction delays in the state of Qatar. *International Journal of Construction Project Management, 6*, 39-62. Retrieved from https://www.novapublishers.com

Jin, R.-Z., Han, S., Hyun, C.-T., & Kim, J.-H. (2014). Improving accuracy of early stage cost estimation by revising categorical variables in a case-based reasoning model. *Journal of Construction Engineering and Management, 140*(7), 1-11. doi:10.1061/(ASCE)CO.1943-7862.0000863

Jordan, A. (2014). Risk management for project driven organizations: A strategic guide to Portfolio, program and PMO success. *Project Management Journal, 45*, e3. doi:10.1002/pmj.21415

Kaczynski, D., Salmona, M., & Smith, T. (2013). Qualitative research in finance. *Australian Journal of Management, 39*, 127-135. doi:10.1177/0312896212469611

Kafle, N. P. (2013). Hermeneutic phenomenological research method simplified. *Bodhi: An Interdisciplinary Journal, 5*, 181-200. doi:10.1177/0312896212469611

Kaleshovska, N. (2014). Adopting project management offices to exploit the true benefits of project management. *Economic Development*, (1-2), 151-165. Retrieved from http://www.ceeol.com

Kenley, R. (2014). Productivity improvement in the construction process. *Construction*

Management and Economics, 32, 489-494. doi:10.1080/01446193.2014.930500

Khamooshi, H., Cioffi, D. F. (2013). Uncertainty in task duration and cost estimates: Fusion of probabilistic forecasts and deterministic scheduling. *Journal of Construction Engineering and Management, 139*, 488-497. doi:10.1061/(ASCE)CO.1943-7862.0000616

Khan, A. U. (2014). Effects of cultural assimilation on the performance of a construction project – evidence from UAE. *Benchmarking: An International Journal, 21,* 430-449. doi:10.1108/BIJ-09-2012-0055

Khorsan, R., & Crawford, C. (2014). External validity and model validity: A conceptual approach for systematic review methodology. *Evidence-Based Complementary and Alternative Medicine, 2014,* 1-12. doi:10.1155/2014/694804

Kihn, L. & Ihantola, E. (2015). Approaches to validation and evaluation in qualitative studies of management accounting. *Qualitative Research in Accounting & Management, 12*(3), 230-255. doi:10.1109/QRAM-03-2013-0012

Kirkwood, A., & Price, L. (2013). Examining some assumptions and limitations of research on the effects of emerging technologies for teaching and learning in higher education. *British Journal of Educational Technology, 44,* 536-543. doi:10.1111/bjet.12049

Kissi, E., Ahadzie, D. K., & Badu, E. (2014). Constraints to the development of professional project management practices in the Ghanaian construction industry. *Journal of Construction Project Management and Innovation, 4,* 791-808. Retrieved from https://www.sabinet.co.za/

Ko, Y., & Han, S. (2017). A duration prediction using a material-based progress management methodology for construction operation plans. *Sustainability, 9*, 635. doi:10.3390/su9040635

Koelsch, L. E. (2013). Reconceptualizing the member check interview. *International Journal of Qualitative Methods*, *12*, 168-179. Retrieved fromhttp://www.ualberta.ca

Kozlovska, M., & Spisakova, M. (2013). Construction waste generation across construction project life-cycle. *Organization, Technology & Management in Construction: An International Journal*, *5*, 687-695. doi:10.5592/otmcj.2013.1.5

Kumar, N. K. (2013). Informed consent: Past and present. *Perspectives in Clinical Research*, *4*(1), 21-25. doi:10.4103/2229-3485.106372

Lappe, M., & Spang, K. (2014). Investments in project management are profitable: A case study-based analysis of the relationship between the costs and benefits of project management. *International Journal of Project Management, 32*, 603-612. doi:10.1016/j.ijproman.2013.10.005

Laufer, A. (2012). *Mastering the leadership role in project management: Practices that deliver remarkable results.* Upper Saddle River, NJ: FT Press

Leedy, P. D., & Ormrod, J. E. (2013). *Practical research: Planning and design* (10th ed.). Upper Saddle River, NJ: Pearson Education.

Lia, H. Y., Abdul Aziz, A.-R., & Chan, T. K. (2014). Effect of the global financial crisis on the financial performance of public listed construction companies in Malaysia. *Journal of Financial Management of Property and Construction, 19*, 246-263.

doi:10.1108/JFMPC-02-2014-0002

Lichterman, P., & Reed, I. A. (2015). Theory and contrastive explanaition in ethnography. *Sociological Methods & Research, 44,* 585-635. doi:10.1177/0049124114554458

Li, L., Gray, D. E., Lockwood, A. J., & Buhalis, D. (2013). Learning about managing the business in the hospitality industry. *Human Resources Development Quarterly, 24,* 525-559. doi:10.1002/hrdq.21171

Lind, H., & Brunes, F. (2015). Explaining cost overruns in infrastructure projects: A new framework with applications to Sweden. *Construction Management and Economics, 33,* 554-568. doi:10.1080/01446193.2015.1064983

Lindhard, S. (2014). Understanding the effect of variation in a production system. *Journal of Construction Engineering and Management, 140*(11), 1-8. doi:10.1061/(ASCE)CO.1943-7862.0000887

Ling, F. Y. Y., & Ang, W. T. (2013). Using control systems to improve construction project outcomes.*Engineering, Construction and Architectural Management, 20,* 576-588. doi:10.1108/ECAM-10-2011-0093

Lisse, S. D. (2013). Applying system dynamics for outsourcing services in design-build projects. *Journal of Project, Program & Portfolio Management, 4*(2), 20-36. Retrieved from http://www.exlibrisgroup.com/

Liu, Z., Osmani, M., Demian, & Baldwin, A. (2015). A BIM-aided construction waste minimisation framework. *Automation in Construction, 59,* 1-23. doi:10.1016/j.autcon.2015.07.020

Loh, J. (2013). Inquiry into issues of trustworthiness and quality in narrative studies: A perspective. *Qualitative Report, 18,* 1-15. Retrieved from http://www.nova.edu

Lopez, A. D., Bradley-Klug, K. L., Quinn, G. P., Reitsema, L. J., Ruble, K., & Slifer, K. J. (2014). Adolescent survivors of childhood cancer and their perspectives of the transition to early survivorship: An exploratory qualitative investigation. *Journal of Adolescent and Young Adult Oncology, 3,* 130-137. doi:10.1089/jayao.2014.0001

Love, P. E. D., Wang, X., Sing, C., & Tiong, R. L. K. (2013). Determining the probability of project cost overruns. *Journal of Construction Engineering and Management, 139*(3), 321-330. doi:10.1061/(ASCE)CO.1943-7862.0000575

Lumsden, K. (2013). You are what you research: Researcher partisanship and the sociology of the 'underdog'. *Qualitative Research, 13,* 3-18. doi:10.1177/1468794112439012

Lu, W., Peng, Y., Shen, Q., & Li, H. (2013). Generic model for measuring benefits of BIM as a learning tool in construction tasks. *Journal of Construction Engineering and Management, 139,* 195-203. doi:10.1061/(ASCE)CO.1943-7862.0000585

Mahamid, I. (2013). Common risks affecting time overrun in road construction projects in Palestine: Contractors' perspective. *Australian Journal of Construction Economics and Building, 13*(2), 45-53. doi:10.5130/ajceb.v13i2.3194

Mahamid, I. (2013). Frequency of time overrun causes in road construction in Palestine: Contractor's view. *Organization, Technology and Management in Construction. An International Journal, 5,* 720-729. doi:10.5592/otmcj.2013.1.9

Maier, E., & Oana, B. (2014). “On time and on budget”: Harnessing creativity in large scale projects. *International Journal of Project Management, 32*, 1123-1133. doi:10.1016/j.ijproman.2014.02.009

Mariusz, H. (2014). Models of PMO functioning in a multi-project environment. *Procedia-Social and Behavioral Sciences, 119*, 46-54. doi:10.1016/j.sbspro.2014.03.008

Marshall, B., Cardon, P., Poddar, A., & Fontenot, R. (2013). Does sample size matter in qualitative research? A review of qualitative interview in IS research. *Journal of Computer Information Systems, 54*, 11-22. Retrieved from http://www.iacis.org/jcis/jcis.php

Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (6th ed.). Thousand Oaks, CA: Sage.

Maxwell, J. A. (2013). *Qualitative research design: An interactive approach.* Thousand Oaks, CA: Sage.

Maxwell, J. A. (2016). Expanding the history and range of mixed methods research. *Journal of Mixed Methods Research, 10*(1), 12-27. doi:10.1177/1558689815571132

Ma, Z., Wei, Z., & Zhang, X. (2013). Semi-automatic and specification-compliant cost estimation for tendering of building projects based on IFC data of design model. *Automation in Construction, 30*, 126-135. doi:10.1016/j.autcon.2012.11.020

McCord, J., McCord, M., Davis, P. T., Haran, M., & Rodgers, W. J. (2015). Understanding delays in housing construction: Evidence from Northern Ireland.

Journal of Financial Management of Property and Construction, 20, 286-319. doi:10.1108/JFMPC-07-2015-0028

McCusker, K., & Gunaydin, S. (2015). Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion, 30,* 537-542. doi:10.1177/02676559114559116

Memon, A. H., & Abdul Rahman, I. (2013). Analysis of cost overrun factors for small scale construction projects in Malaysia using PLS-SEM method. *Modern Applied Science, 7,* 78-88. doi:10.5539/mas.v7n8p78

Memon, A. H., & Abdul Rahman, I. (2014). SEM-PLS analysis of inhibiting factors of cost performance for large construction projects in Malaysia: Perspective of clients and consultants. *The scientific World Journal, 2014,* 1-9. doi:10.1155/2014/165158

Memon, A. H., Abdul Rahman, I., Zainun, N. Y., & Abd Karim, A. T. (2014). Web-based risk assessment technique for time and cost overrun (WRATTCO)-a framework. *Procedia-Social Behavioral Sciences, 129,* 178-185. doi:10.1016/j.sbspro.2014.03.664

Mendes, J., Cunha, J., Duarte, F., Engels, G., Saraiva, J., Sauer, S. (2017). Towards systematic spreadsheet construction processes. *International Conference on Software Engineering Companion,* 356-358. doi:10.1109/ICSE-C.2017.141

Meng, X. (2014). Is early warning effective for the improvement of problem solving and project performance? *Journal of Management in Engineering, 30,* 146-152. doi:10.1016/(ASCE)ME.1943-5479.0000205

Michels, E., Grijo, P. E. A., Machado, E., & Selig, P. M. (2012). Knowledge management, project integration and corporate sustainability: Is there a link? *Journal of Project, Program & Portfolio Management, 3,* 17-27. Retrieved from http://www.exlibrisgroup.com/

Mikene, S., Gaizauskaite, I., & Valaviciene, N. (2013). Qualitative interviewing: Field-work realities. *Socialinis Darbas, 12,* 49-61. Retrieved from http://www.mruni.eu

Mir, F. A., & Pinnington, A. H. (2014). Exploring the value of project management: Linking project management performance and project success. *International Journal of Project Management, 32,* 202-217. doi:10.1016/j.ijproman.2013.05.012

Mojtahed, R., Nunes, M. B., Martins, J. T., & Peng, A. (2014). Equipping the constructivist researcher: The combined use of semistructured interviews and decision-making maps. *Electronic Journal of Business Research Methods*, *12*(2), 87-95. Retrieved from http://www.ejbrm.com/main.html

Mok, K. Y., Shen, G. Q., & Yang, J. (2015). Stakeholders management studies in mega construction projects: A review and future directions. *International Journal of Project Management, 33,* 446-457. doi:10.1016/j.ijproman.2014.08.007

Montero-Marin, J., Carrasco, J. M., Roca, M., Serrano-Blanco, A., Gili, M., Mayoral, F.,… & Garcia-Campayo, J. (2013). Expectations, experiences and attitudes of patients and primary care health professionals regarding online psychotherapeutic interventions for depression: Protocol for a qualitative study. *BMC Psychiatry, 13*(1), 64-79. doi:10.1186/1471-244X-13-64

Montes-Guerra, M. I., Gimena, F. N., Perez-Ezcurdia, M. A., & Diez-Silva, H. M. (2014). The influence of monitoring and control on project management success. *International Journal of Construction Project Management*, *6*, 163-184. Retrieved from https://www.novapublishers.com/catalog/product_info.php?products_id=9057

Morse, J. M., & Coulehan, J. (2015). Maintaining confidentiality in qualitative publications. *Qualitative Health Research*, *25*,151-152. doi:10.1177/1049732314563489

Motaleb, O. H., & Kishk, M. (2014). Assessing risk response maturity: A framework for construction projects success in the United Arab Emirates. *International Journal of Managing Projects in Business, 7*, 247-262. doi:10.1108/IJMPB-03-2013-0013

Mpofu, B., Ochieng, E. G., Moobela, C., & Pretorius, A. (2017). Profiling causative factors leading to construction project delays in the United Arab Emirates. *Engineering, Construction and Architectural Management, 24*, 346-376. doi:10.1108/ECAM-05-2015-0072

Mutula, S. M. (2014). Managing research data in the information society. *African Journal of Library, Archives and Information Science*, *24*, 119-121. Retrieved fromhttp://www.inasp.info

Myers, M. D. (2013). *Qualitative research in business & management (2nd ed.)*. Thousand Oaks, CA: Sage.

Narag, R., & Maxwell, S. A. (2014). Understanding cultural context when collecting field data: Lessons learned from field research in a slum area in the Philippines.

Qualitative Research, 14, 311-326. doi:10.1177/1468794112473496

Nazarko, J. (2017). Improvement of construction project management processes. *Journal of Engineering, Project, and Production Management, 7*(2), 54. Retrieved from http://www.ppml.url.tw/EPPM_Journal

Niazi, G. A., & Painting, N. (2017). Significant factors causing cost overruns in the construction industry in Afghanistan. *Procedia Engineering, 182*, 510-517. doi:10.1016/j.proeng.2017.03.145

Noble, H., & Smith, J. (2015). Issues of validity and reliability in qualitative research. *Evidence-Based Nursing, 18*(2), 34-35. doi:10.1136/eb-2015-102054

Northouse, P. G. (2013). *Leadership: Theory and practice* (6th ed.). Thousand Oaks, CA: Sage.

Ochieng, O. M., Shedrack, M., & Douglas, M. (2015). Role of cost estimation on timelines in completion of Kenya national government building construction projects. *International Journal of Management Research & Review, 5*, 285-295. Retrieved from www.ijmrr.com

Oko John, A., & Itodo, D. E. (2013). Professionals' views of material wastage on construction sites and cost overruns. *Organization, Technology & Management in Construction: An International Journal*, *5*, 747-757. doi:10.5592/otmcj.2013.1.11

Olawale, Y., & Sun, M. (2015). Construction project control in the UK: Current practice, existing problems and recommendations for future improvement. *International Journal of Project Management, 33*, 623-637. doi:10.1016/j.ijproman.2014.10.003

Omona, J. (2013). Sampling in qualitative research: Improving the quality of research outcomes in higher education. *Makerere Journal of Higher Education, 4*, 169-185. doi:10.4314/majohe.v4i2.1

O'Reilly, M., & Parker, N. (2013). 'Unsatisfactory saturation': A critical exploration of the notion of saturated sample sizes in qualitative research. *Qualitative Research, 13*, 190-197. doi:10.1177/1468794112446106

Osei, V. (2013). The construction industry and its linkages to the Ghanaian economy-polices to improve the sector's performance. *International Journal of Development and Economic Sustainability*, *1*(1), 56-72. Retrieved from http://www.eajournals.org

Ozdemir, G., & Adan, O. (2014). Film Tourism Triangulation of Destinations. *Procedia-Social and Behavioral Sciences, 148*, 625-633. doi:10.1016/j.sbspro.2014.07.090

Paechter, C. (2013). Researching sensitive issues online: Implications of a hybrid insider outsider position in a retrospective ethnographic study. *Qualitative Research, 13*, 71-86. doi:10.1177/1468794112446107

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2013). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research,* 1-12. doi:10.1007/s10488-013-0528-y

Panas, A., Pantouvakis, J.-P., & Lambropoulos, S. (2014). A simulation environment for construction project manager competence development in construction management. *Procedia – Social and Behavioral Sciences, 119,* 739-747.

doi:10.1016/j.sbspro.2014.03.083

Patichol, P., Wongsurawat, W., & Johri, L. M. (2014). Upgrade strategies in the Thai silk industry: Balancing value promotion and cultural heritage. *Journal of Fashion Marketing and Management, 18*, 20-35. doi:10.1108/JFMM-09-2011-0059

Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). Thousand Oaks, CA: Sage.

Peredaryenko, M. S., & Krauss, S. E. (2013). Calibrating the human instrument: Understanding the interviewing experience of novice qualitative researchers. *The qualitative report*, *18*(43), 1-17. Retrieved from www.nova.edu/ssss/QR/QR18.

Perry, A. S. (2012). *Determining the keys to entrepreneurial sustainability beyond the first five years* (Doctoral dissertation). Retrieved from ProQuest Digital Dissertations and Theses Database. (UMI No. 3552549)

Perry, D. J. (2013). Transcendental method for research with human subjects: A transformative phenomenology for the human sciences. *Field Methods, 25*, 262-282. doi:10.1177/1525822X12467105

Peterson, M. (2014). Interviewing international students to understand the process of expatriate acculturation. *Marketing Education Review*, *24*, 59-62. doi:10.2753/MER1052-8008240110

Polat, G., Okay, F., & Eray, E. (2014). Factors affecting cost overruns in micro-scaled construction companies. *Procedia Engineering, 85*, 428-435. doi:10.1016/j.proeng.2014.10.569

Polkinghorne, D. E. (2013). Qualitative research and media. In K. E. Dill (Ed.), *Oxford*

handbook of media psychology (pp. 137-156). Oxford, England: Oxford University Press.

Project Management Institute (2013). Project management body of knowledge (PMBOK®; 5th ed.). Newtown Square, PA: Author.

Pucko, Z., Suman, N., & Klansek, U. (2014). Building information modeling based time and cost planning in construction projects. *Organization, Technology & Management in Construction: An International Journal, 6*, 958-971. doi:10.5592/otmcj.2014.1.6

Rama, S., Sathya, A., Shasikala, A., & Clifa, I. (2017). A study of project planning using the deterministic and probabilistic models by network scheduling techniques. *International Journal of Engineering Research and Application, 7*, 32-38. doi:10.9790/9622-0703043238

Ramazani, J., & Jergeas, G. (2015). Project managers and the journey from good to great: The benefits of investment in project management training and education. *International Journal of Project Management, 33*, 41-52. doi:10.1016/j.ijproman.2014.03.012

Ramlo, S. (2016). Mixed method lessons learned from 80 years of Q methodology. *Journal of Mixed Methods Research, 10*, 28-45. doi:10.1177/1558689815610998

Renuka, S. M., Kamal, S., & Umarani, C. (2017). A model to estimate the time overrun risk in construction projects. *Theoretical and Empirical Researches in Urban Management, 12*, 64-76. Retrieved from http://www.um.ase.ro

Robinson, O. C. (2014). Sampling in interview-based qualitative research: A theoretical

and practical guide. *Qualitative Research in Psychology*, *11*(1), 25-41. doi:10.1080/14780887.2013.8015

Robinson, S. G. (2013). The relevancy of ethnography to nursing research. *Nursing Science Quarterly*, *26*(1), 14-19. doi:10.1177/0894318412466742

Rosenfeld, Y. (2014). Root-cause analysis of construction-cost overruns. *Journal of Construction Engineering and Management, 140* (1), 1-10. doi:10.1061/(ASCE)CO.1943-7862.0000789

Roy, K., Zvonkovic, A., Goldberg, A., Sharp, E., & LaRossa, R. (2015). Sampling richness and qualitative integrity: Challenges for research with families. *Journal of Marriage and Family, 77*, 243-260. doi:10.1111/jomf.12147

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative interviewing: The art of hearing data* (3rd ed.). Thousand Oaks, CA: Sage.

Ruqaishi, M., & Bashir, H. A. (2015). Causes of delay in construction projects in the oil and gas industry in the Gulf Cooperation Council countries: A case study. *Journal of Management in Engineering*, *31*(3), 1-8. doi:10.1016/(ASCE)ME.1943-5479.0000248

Russell, M. M., Howell, G., Hsiang, S. M., & Liu, M. (2013). Application of time buffers to construction project task durations. *Journal of Construction Engineering and Management, 139*, 1-10. doi:10.1061/(ASCE)CO.1943-7862.0000735

Russell, M. M., Hsiang, S. M., Liu, M., & Wambeke, B. (2014). Causes of time buffer and duration variation in construction project tasks: Comparison of perception to

reality. *Journal of Construction Engineering and Management, 140*, 1-12. doi:10.1061/(ASCE)CO.1943-7862.0000819

Russell, M. M., Liu, M., Howell, G., & Hsiang, S. M. (2015). Case studies of the allocation and reduction of time buffer through use of the last planner system. *Journal of Construction Engineering and Management, 141*, 1-10. doi:10.1061/(ASCE)CO.1943-7862.0000900

Salajeghe, S., Nejad, A. S., & Soleimani, S. (2014). Analysis of the role of quality management in creating knowledge management value chain. *International Journal of Academic Research in Business and Social Sciences, 4*, 31-46. Retrieved from http://www.hrmars.com

Sambasivan, M., Deepak, T. J., Salim, A. N., & Ponniah, V. (2017). Analysis of delays in Tanzanian construction industry: Transaction cost economics (TCE) and structural equation modeling (SEM) approach. *Engineering, Construction and Architectural Management, 24*, 308-325. doi:10.1108/ECAM-09-2015-0145

Sanjari, M., Bahramnezhad, F., Fomani, F. K., Shoghi, M., & Cheraghi, M. A. (2014). Ethical challenges of researchers in qualitative studies: The necessity to develop a specific guideline. *Journal of Medical Ethics and History of Medicine*, 8, 7-14. Retrieved from http://jmehm.tums.ac.ir/index.php/jmehm

Schaupp, L., & Belanger, F. (2014). The value of social media for small businesses. *Journal of Information Systems*, *28*(1), 187-207. doi:10.2308/isys-50674

Senge, P., Smith, B., Kruschwitz, N., Laur, J., & Schley, S. (2008). *The necessary revolution: Working together to create a sustainable world*. New York, NY:

Broadway Books.

Shehu, Z., Endut, I. R., Akintoye, A., & Holt, G. D. (2014). Cost overrun in the Malaysian construction industry projects: A deeper insight. *International Journal of Project Management, 32,* 1471-1480. doi:10.1016/j.ijproman.2014.04.004

Shipman, M. D. (2014). *The limitations of social research* (4th ed.). New York, NY: Routledge.

Shoup, V. A. (2015). *One hospital's patient satisfaction plans in response to a changing healthcare environment* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (UMI No. 3685479)

Silverman, D. (2013). *Doing qualitative research: A practical handbook* (4th ed.). Thousand Oaks, CA: Sage.

Singhania, M. (2013). Cost-benefit analysis of a staff recreation centre project: Build or lease? – A case study. *Journal of Project, Program, & Portfolio Management, 4*, 41-49. Retrieved from http://epress.lib.uts.edu.au/journals/index.php/pppm/article/view/2674/3813

Singh, A. S. (2014). Conducting case study research in non-profit organisations. *Qualitative Market Research: An International Journal*, *17*, 77-84. doi:10.1108/QMR-04-2013-0024

Spalek, S. (2014). Finding a new way to increase project management efficiency in terms of time reduction. *Engineering Economics, 25*, 538-548. doi:10.5755/j01.ee.25.5.8419

Staller, K. M. (2013). Epistemological boot camp: The politics of science and what every

qualitative researcher needs to know to survive in the academy. *Qualitative Social Work, 12*, 395-413. doi:10.1177/1473325012450483

Storvang, P., & Clarke, A. H. (2014). How to create a space for stakeholders' involvement in construction. *Construction Management and Economics, 32*, 1166-1182. doi:10.1080/01446193.2014.966732

Suarez-Ortega, M. (2013). Performance, reflexivity, and learning through biographical-narrative research. *Qualitative Inquiry, 19*, 189-200. doi:10.1177/107780041266223

Syed Jamaluddin, S. Z. H., Mohammad, M. F., & Ahmad, K. (2014). Enhancing the quality of construction environment by minimizing the cost variance. *Procedia-Social and Behavioural Sciences, 153*, 70-78. doi:10.1016/j.sbspro.2014.10.042

Tang, Y., Liu, R., & Sun, Q. (2014). Schedule control model for linear projects based on linear scheduling method and constraint programming. *Automation in Construction, 37*, 22-37. doi:10.1016/j.autcon.2013.09.008

Taylor, S., & Land, C. (2014). Organizational anonymity and the negotiation of research access. *Qualitative Research in Organizations and Management, 9*(2), 98-109. doi:10.1108/QROM-10-2012-1104

Teitcher, J. F., Bockting, W. O., Bauermeister, J. A., Hoefer, C. J., Miner, M. H., & Klitzman, R. L. (2015). Detecting, preventing, and responding to 'fraudsters' in internet research: Ethical and tradeoffs. *Journal of Law, Medicine & Ethics, 43*, 116-133. doi:10.1111/jlme.12200

Thomas, E., & Magilvy, J. (2011). Qualitative rigor or research validity in qualitative

research. *Journal for Specialists in Pediatric Nursing, 16,* 151–155. doi:10.1111/j.1744-6155.2011.00283.x

Thrope, A. S. (2014). Doing the right thing or doing the thing right: Implications of participant withdrawal. *Organizational Research Methods, 17,* 255-277. doi:10.1177/1094428114524828

Too, E. G., & Weaver, P. (2014). The management of project management: A conceptual framework for project governance. *International Journal of Project Management, 32,* 1382-1394. doi:10.1016/j.ijproman.2013.07.006

Trangkanont, S., & Charoenngam, C. (2014). Critical failure factors of public-private partnership low-cost housing program in Thailand. *Engineering, Construction and Architectural Management, 21,* 421-443, doi:10.1108/ECAM-04-2012-0038

Travaglini, A., Radujkovic, M., & Mancini, M. (2014). Building information modelling (BIM) and project management: A stakeholders perspective. *Organization, Technology and Management in Construction. An International Journal, 6*(2), 1058-1065. doi:10.5592/otmcj.2014.2.8

Tsang, E. W. (2014). Generalizing from research findings: The merits of case studies. *International Journal of Management Reviews, 16,* 369-383. doi:10.1111/ijmr.12024

Turner, R., & Zolin, R. (2012). Forecasting success on large projects: Developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. *Project Management Journal, 43,* 87-99. doi:10.1002/pmj.21289

Uher, T. E., & Loosemore, M. (2004). *Essentials of construction project management.*

Sydney, Australia: UNSW Press.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences, 15,* 398-405. doi:10.1111/nhs.12048

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly, 37,* 21-54. Retrieved from http://misq.org/

Wallace, M., & Sheldon, N. (2015). Business research ethics: Participant observer perspectives. *Journal of Business Ethics, 128,* 267-277. doi:10.1007/s10551-014-2102-2

Wang, L. C., Cheng, C. Y., Tseng, Y. T., & Liu, Y. F. (2015). Demand-pull replenishment model for hospital inventory management: A dynamic buffer-adjustment approach. *International Journal of Production Research, 53,* 7533-7546. doi:10.1080/00207543.2015.1102353

Warburton, R. D. H. (2014). A new schedule estimation technique for construction projects. *Organization, Technology and Management in Construction. An International Journal, 6,* 1075-1082. doi:10.5592/otmcj.2014.3.1

Weisheng, L., Liu, A. M. M., Hongdi, W., & Zhongbing, W. (2013). Procurement innovation for public construction projects: A study of agent-construction system and public-private partnership in China. *Engineering, Construction and Architectural Management, 20,* 543-562. doi:10.1108/ECAM-09-2011-0084

Williams, T. P., & Gong, J. (2014). Predicting construction cost overruns using text

mining, numerical data and ensemble classifiers. *Automation in Construction, 43*, 23-29. doi:10.1016/j.autcon.2014.02.014

Willig, C. (2013). *Introducing qualitative research in psychology* (3rd ed.). New York, NY: McGraw-Hill.

Wilson, V. (2014). Research methods: Triangulation. *Evidence Based Library and Information Practice, 9*(1), 74-75. Retrieved from http://ejournals.library.ualberta.ca/index.php/EBLIP

Wolgemuth, J. R., Erdil-Moody, Z., Opsal, T., Cross, J. E., Kaanta, T., Dickmann, E. M., & Colomer, S. (2015). Participants' experiences of the qualitative interview: Considering the importance of research paradigms. *Qualitative Research, 15*, 351-372. doi:10.1177/1468794114524222

Wu, D., & Passerini, K. (2013). Uncovering knowledge-based time management practices: Implications for project management. *International Journal of Managing Projects in Business, 6*, 332-348. doi:10.1108/17538371311319052

Wysocki, R. K. (2014). *Effective project management: Traditional, agile, extreme* (7th ed.). Indianapolis, IN: John Wiley & Sons.

Yang, J.-B., Chu, M.-Y., & Huang, K.-M. (2013). An empirical study of schedule delay causes based on Taiwan's litigation cases. *Project Management Journal, 44*(3), 21-31. doi:10.1002/pmj.21337

Yap, J. B. H., Abdul-Rahman, H., & Chen, W. (2017). Collaborative model: Managing design changes with reusable project experiences through project learning and effective communication. *International Journal of Project Management, 35*,

1253-1271. doi:10.1016/j.ijproman.2017.04.010

Yates, J. K. (2013). Sustainable methods for waste minimisation in construction. *Construction Innovation, 13,* 281-301. doi:10.1108/CI-Nov-2011-0054

Yildiz, A. E., Dikmen, I., Birgonul, M. T., Ercoskun, K., & Alten, S. (2014). A knowledge-based risk mapping tool for cost estimation of international construction projects. *Automation in Construction, 43,* 144-155. doi:10.1016/j.autcon.2014.03.010

Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European Journal of Education, 48,* 311-325. doi:10.1111/ejed.12014

Yin, R. K. (2014). *Case study research: Designs and methods* (5th ed.). Thousand Oaks, CA: Sage.

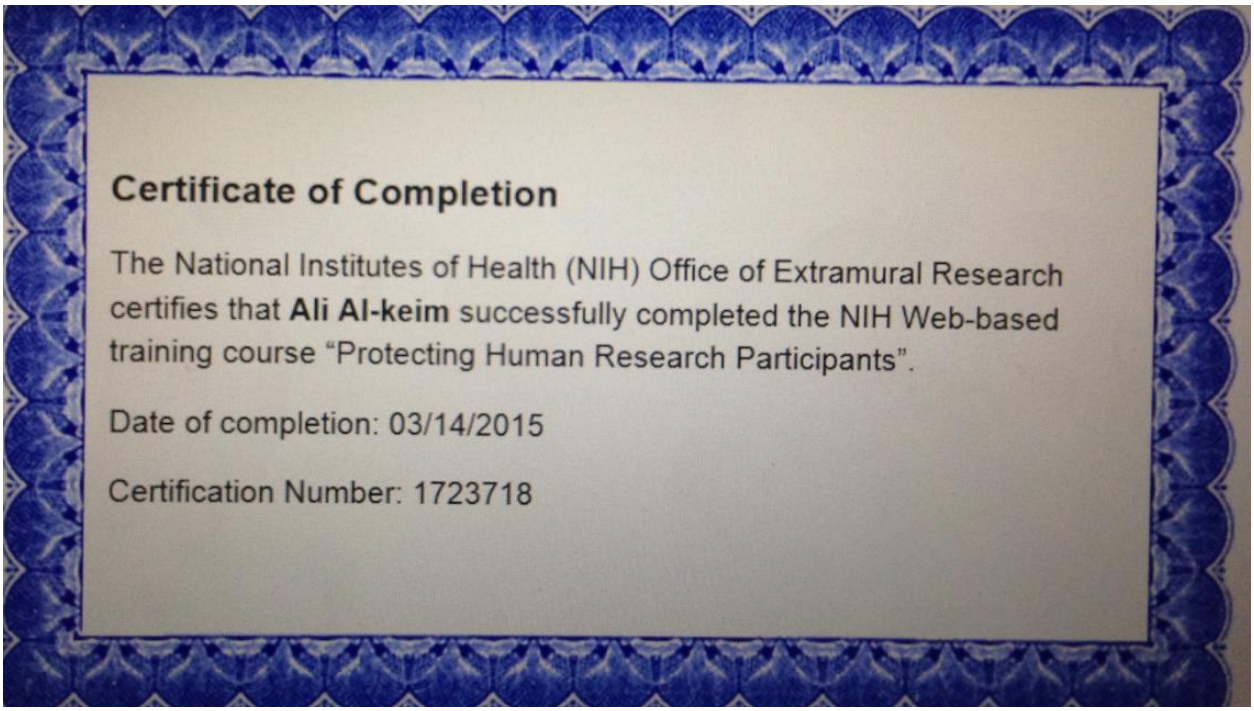
Yuan, H. (2013). Critical management measures contributing to construction waste management: Evidence from construction projects in China. *Project Management Journal, 44*, 101-112. doi:10.1002/pmj.21349

Yu, H., Abdullah, A., & Saat, R. M. (2014). Overcoming time and ethical constraints in the qualitative data collection process: A case of information literacy research. *Journal of Librarianship and Information Science*, 46, 243-257. doi:10.1177/0961000614526610

Yusuwan, N. M., & Adnan, H. (2013). Assessing extension of time application in Malaysian construction industry: Views from professionals. *Procedia – Social and Behavioral Science, 105*, 54-63. doi:10.1016/j.sbspro.2013.11.007

Zhang, L., & Fan, W. (2013). Improving performance of construction projects: A project manager's emotional intelligence approach. *Engineering, Construction and Architectural Management, 20*, 195-207. doi:10.1108/09699981311303044

Appendix A: National Institute of Health Form



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Ali Al-keim** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 03/14/2015

Certification Number: 1723718

Appendix B: Interview Protocol

I proposed and used the following interview protocol:

1. After collecting the signed Letter of Cooperation with the details of the senior managers, I will randomly select one manager from each organization and send an email, requesting acceptance to conduct the interviews. The draft email will be as follow:

   Dear Participant

   You succeeded in reducing cost overruns and schedule delays in a construction project. As part of completing my doctoral study, I would like to conduct an interview with you to explore strategies contributed to success.

   If you agree to participate in this research, the interview date, time, and location will be at your convenient. The purpose of the study is to explore strategies senior managers use to reduce cost overruns and schedule delays of construction projects in Qatar. Your participation in the study is voluntary. Attached is the consent form that includes the procedures, for your review and acceptance. All shared information will be strictly confidential as referred to in the *privacy* section of the consent form. The research question is:

   What strategies do senior managers use to reduce cost overruns and schedule delays?

   The interview questions are:

   1. What is your experience of construction projects that involved successful managers who reduced cost overruns and schedule delays?

2. What are the lessons learned from previous projects that experienced cost overruns and schedule delays?
3. What strategies do you use to reduce cost overruns and schedule delays?
4. What difficulties did you face when developing and implementing these strategies?
5. How did you address the difficulties?
6. What are the benefits of using management software to reduce cost overruns and schedule delays?
7. What other relevant project management strategies and information would you like to share or recommend to reduce cost overruns and scheduling delays?

For responding to this email, the participant has the choice to contact me directly. Thanking you for your cooperation

2. I will collect the signed consent form from all participants upon receiving their accepting email to participate in the study.
3. I will meet the participants at the date, time, and location preferred by them. I will make a reminding statement to all participants that they can withdraw from the study at any time without consequences. I will adhere to the procedures stipulated in the consent form. I will use probing questions only when needed.
4. I will thank all participants upon completion of the primary and follow-up interviews.

Appendix C: Letter of Cooperation

Letter of Cooperation from a Research Partner

Community Research Partner Name
Contact Information

Date

Dear Ali Al-keim,

Based on my review of your research proposal, I give permission for you to conduct the study entitled Strategies to Reduce Cost Overruns and Schedule Delays in Construction Projects within the Insert Name of Community Partner. As part of this study, I authorize you to interview a senior project manager then do a member checking for the strategies used in reducing cost overrun and schedule delays. I understand you will collect data about the manager strategies, write notices, do member checking to verify the recording, and have access to the documents related the project. Individuals' participation will be voluntary and at their own discretion.

We understand that our organization's responsibilities: include providing names and contact details (emailing address and telephone number). We reserve the right to withdraw from the study at any time if our circumstances change.

I understand that the student will not be naming our organization in the doctoral project report that is published in Proquest.

I confirm that I am authorized to approve research in this setting and that this plan complies with the organization's policies.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Walden University IRB.

Sincerely,
Authorization Official
Contact Information

Walden University policy on electronic signatures: An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically. Electronic signatures are regulated by the Uniform Electronic Transactions Act. Electronic signatures are only valid when the signer is either (a) the sender of the email, or (b) copied on the email containing the signed document. Legally an "electronic signature"

can be the person's typed name, their email address, or any other identifying marker. Walden University staff verify any electronic signatures that do not originate from a password-protected source (i.e., an email address officially on file with Walden).

Appendix D: PMI permission to use a graphic for the study

From: Catherine.Viega@pmi.org
To: alialkeim@hotmail.com
Subject: FW: Online Permissions Request
Date: Fri, 1 Jul 2016 13:05:14 +0000

Dear Mr. Al-Keim,

Thank you for contacting PMI. Since you are only requesting the use of one graphic for your academic dissertation, you are covered under US fair use guidelines and may proceed with using the requested graphic as long as you include appropriate citation. If you have any other questions or requests, please feel free to contact me.

Best regards,

Cat Viega, Pa.C.P. | Intellectual Property Administrator| Project Management Institute | 14 Campus Boulevard, Newtown Square, PA (USA 19073)

www.pmi.org | P: +610-356-4600 x1127 | F: +610-355-1626| catherine.viega@pmi.org