COMMON CAUSES OF IT PROJECT FAILURE IN PUBLIC UNIVERSITIES

by

Stephanie Jones

Doctoral Study Submitted in Partial Fulfillment

Of the Requirements for the Degree of

Doctor of Business Administration

Liberty University, School of Business

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Abstract

Information technology (IT) project management is a dynamic field. It requires a project manager who knows how to manage a project and possesses a knowledge of technology. The purpose of this research is to find the common factors that contribute to IT project failure in public universities in Oklahoma and know what role facilitated the failed IT project. For the purposes of this study, the roles leading the projects are a certified project manager, a non-certified project manager, or a non-project manager. Also, IT projects for this study are ones that require hardware changes, software changes or integrate new technology. The goal of this study is to help public universities successfully implement IT projects. Successfully implementing an IT project in a public university might help the university be a better steward of both taxpayer funds and private donations.

Keywords: information technology project management, causes of information technology project failure, public university information technology project management

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Dedication

This work is dedicated to Kevin, Abbey, Mason, Gunnar, Deacon, and Ethan. You all are the reason I decided to go down this path.

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Through this journey, I have received support from many different people. First my husband, Kevin, always encouraging me to finish. Second, the members of Cohort Six, we have the best group. Cohort Six was a sounding board when confusion was rampant. Third, my colleagues at Rogers State University, Brook, Cathy, Curtis, and Mandy, thanks for the constant encouragement. Finally, my chair Dr. Arrington who was truly a partner during this entire process and my committee member, Dr. Ahmed, was also a great help.

Again, my family put up with my hours of homework and understood, when I could not always participate in the fun things they were doing. I love you guys.

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Section 1: Foundation of the Study

The high failure rate of information technology (IT) projects is a problem in both the public and private sectors. This study focused on the causes of failed IT projects in two-year and four-year public universities in Oklahoma and interviewed IT professionals at these universities fitting this criterion. There are a total of 27 public universities in Oklahoma; 15 four-year universities and 12 two-year universities. This study collected data about causes of IT project failure and whether a certified project manager, non-certified project manager, or a non-project manager led the project.

This study provided valuable information on common factors that contributed to IT project failure and what role led the IT project in the public universities involved in this research. The results of this study will be beneficial for future IT projects in public universities because those facilitating future projects will have information about the causes of IT project failure. In addition, this research gives universities valuable information about project failure points that might occur in the project because of whom the university chose to lead the project.

Background of the Problem

Regardless of the significant improvements made in IT projects, these projects still exhibit high failure rates (Hidding & Nicholas, 2017). The estimate for IT project failure rate in higher education has been estimated as high as 80% and was most recently estimated at 40% (Stamati, Kanellis, & Martakos, 2005; Bloch, Blumberg, & Laartz, 2012; Kubilus, 2016). Across various industries, the common causes of IT project failure revolve around the following: unrealistic schedule, scope creep, lack of a precise definition of requirements, lack of stakeholder involvement, and underestimating the complexity of the IT project (Daniels & LaMarsh, 2007;

Kubilus, 2016). However, there is no research addressing the specific cause of the high IT project failure rate in higher education.

The failure of an IT project for a public university means a waste of human and financial resources. IT projects typically overrun budgeted costs by 24%; however, for projects that do not meet the time deadline or project scope this percentage almost doubles (Sarmento & Renneboog, 2016). Federal and state taxpayers, as well as private contributions, finance public universities, therefore using these dollars wisely will help the university operate more efficiently. This study will provide universities with common causes of IT project failure and what role facilitated the IT project; this knowledge can help universities plan in ways to mitigate failure and thus save valuable resources.

Limited research is available on the causes of the high failure rate of IT projects in public universities. The findings of current research suggest project management certification does not have a significant impact on project success (Saade, Heliu, & Wan, 2015; Abu-rumman, 2015). Research is also available on common causes of IT project failure across industries. However, there is a gap in the research on factors that cause failures in higher education IT projects, including who usually facilitates the IT projects in public universities.

Problem Statement

The general problem addressed was the high failure rate of IT projects in public universities (Keil & Mahring, 2010; Hidding & Nicholas, 2017). The specific problem addressed was the high failure rate of IT projects in two-year and four-year public universities in Oklahoma and the common factors that contributed to the project failures. Nationally, the failure rate has been as high as 80%, but was most recently 40% (Stamati, Kanellis, & Martakos, 2005;

Bloch, Blumberg, & Laartz, 2012; Kubilus, 2016). This study also informed what role led the IT project in the universities involved to add context to the high failure rate of IT projects.

Education has dramatically changed in the past ten years as evident by the various forms of IT implemented in the classroom. With the widespread use of distance learning, IT has become key in education platforms (Ahmed & Kurshid, 2015). IT projects are vital to keeping universities competitive; therefore, a high failure rate of IT projects in a university could cause significant problems for the students and faculty. According to Willaims and Whiting (2016), most universities use some form of a learning management system; a learning management system is a platform that includes communication tools, course content tools, student assessment tools, and grade book tools. Failure in IT projects could cause interruptions in these learning management systems. For instance, if a student does not have access to a learning management system and all functional capabilities, this could hinder interaction with classmates and the instructors, and prevent the student from meeting class requirements on time. For the instructor, IT system failure means the prevention of timely communication with students or prevention of giving feedback for assignments. Both scenarios mean the university is not operating at its optimal technology capacity and might lose any competitive advantage provided by IT.

Purpose Statement

The purpose of this qualitative study collected common causes for IT project failure in two-year and four-year public universities in Oklahoma and determined what role facilitated the IT project; this study used interviews to collect the data. IT projects were those that require software changes, hardware changes or integrate new technology (Taylor, 2003). Common causes of IT project failure and what role facilitated the project were drawn from the interviews and presented as the primary factors affecting IT project failure in the universities studied.

This study considered three scenarios when looking at IT projects: those that used certified project managers, those that used non-certified project managers, and those that used a non-project manager to facilitate the project. For this study, a certified project manager was one who has obtained certification from the Project Management Institute (PMI). A non-certified project manager was one who worked as a project manager without PMI certification. A non-project manager was a facilitator who did not work in the project management profession. For instance, a Director of Information Technology employed by a university would be considered a non-project manager. There was no consideration of the project lead's actual job description when defining the role of certified project manager, non-certified project manager, and non-project manager.

The outcomes of this study provide universities with useful information in decisions about what role implements future IT projects and how to plan for those future projects. Once universities have this data available, universities might consider additional areas of risk management, who should be involved in project planning, and re-evaluate how projects are planned to aid in the prevention of future IT project failure and to maximize the use of resources.

Nature of the Study

There are three ways to conduct research, quantitatively, qualitatively, and mixed method, which is a combination of quantitative and qualitative. Quantitative research involves discovering the relationship between variables before and after manipulation of variables (Martin & Bridgmon, 2012). After observation, the researcher measures outcomes or changes in these variables. Quantitative research designs include correlational quantitative design, descriptive quantitative design, and causal-comparative quantitative design (Creswell & Creswell, 2018).

Qualitative research is a collection of narratives, stories, or descriptions of various experiences that tell why or how something happened from an individual perspective (Jackson, Drummond, & Camara, 2007; Stake, 2010). Qualitative research relies heavily on human perception and understanding. Qualitative research designs include narrative inquiry, phenomenological, case study, grounded theory, and ethnography (Creswell & Poth, 2018).

Mixed method research uses at least one quantitative method and one qualitative method to answer a research question and prove or disprove hypotheses (Creswell & Plano Clark, 2018). Mixed methods research designs include convergent design, explanatory sequential design, and exploratory sequential design with variations in each type of mixed method design (Creswell & Plano Clark, 2018).

This study used a qualitative case study design. Case study research is appropriate when studying a specific event or series of events (Stake, 2010; Yin, 2014). There are three different types of case study research, instrumental case study, collective case study, and intrinsic case study (Cresswell & Poth, 2018). Instrumental and collective case study research focuses on a single issue. This type of research uses either a single case or multiple cases to demonstrate the issue (Yin, 2014). In an intrinsic case study, the occurrence of a unique situation is researched (Stake, 2010). Case studies are bound by a specific time, activity, or process from one or more individuals and then the researcher develops an in-depth analysis of the topic. Case study does fit the parameters of this research because the researcher will be using multiple cases of IT project failure to demonstrate the common causes of failed IT projects and the difficulties this presents in public universities. A case study researcher collects data by interviewing, observing, collecting documents, viewing pictures, or a combination of these (Liberty University, 2017). For this study, open-ended interview questions collected the data. Other valid methods of

qualitative research not used in this study are phenomenological, narrative inquiry, grounded theory, and ethnography.

Phenomenology is appropriate to use for describing how human beings experience a common phenomenon (Adams & van Manen, 2017). Phenomenology attempts to set aside biases and only tell the story of the individual's experience (Creswell & Poth, 2018). Phenomenology is not appropriate for this research because no single lived experience was observed.

The narrative research design is a qualitative research design that studies the lives of individuals and describes events throughout a lifetime to provide an account of a series of events, presented in chronological order by the researcher (Cresswell & Poth, 2018). Narrative research tells what happened during an event and gives context to the event. This research did not study the lives of individuals through a series of events and therefore was not appropriate for this research.

Grounded theory is appropriate to use when the researcher wants to develop an original theory based on data collected in the study (Urquhard, 2013). Grounded theory is often used when there is very little research or information about a topic (Charmaz, 2014). Grounded theory was not appropriate for this study because there is significant research about IT project management and no new theory was developed from this research.

Finally, ethnography is appropriate to use when a researcher wants to give a complete description of a cultural group (LeCompte & Schensul, 1999). Often, an ethnographic researcher becomes immersed in the culture being studied. Ethnographic research was not appropriate for this study because the occurrences for this research have already happened and there is no cultural group specific to this research.

Research Questions

The findings of this research sought to determine the common causes of IT project failure in two-year and four-year public universities in Oklahoma and recognize what role facilitated the IT project. Based on this, the research questions for this study were as follows:

RQ1: What are the common factors that contribute to the high rate of information technology project failure in public universities in Oklahoma?

RQ2: What role facilitated the failed IT project in public universities in Oklahoma?

Conceptual Framework

Sociotechnical theory describes relationships between people and technology where consideration of both components optimize performance in any given task (Trist, Higgin, Murray, & Pollock, 1963; Kessler, 2013). Hendrick and Kleiner (2001) and Guimaraes (2009) divided sociotechnical systems into four interrelated subsystems: 1) personnel subsystem, 2) technological subsystem, 3) work design subsystem, and 4) external environment subsystem.

The personnel subsystem describes ways in which tasks are performed with people, and the external environment subsystem is anything outside of the project that might impact the outcome (Hendrick & Kleiner, 2005). The technological subsystem identifies the tasks performed with technology components and the work design subsystem describes how the organization structures work and interact with other systems (Hendrick & Kleiner, 2005). This research was a case study and collected data that included the personnel subsystem, the external environment subsystem, the technological subsystem, and the work design subsystem.

Sociotechnical theory has two major components within the sociocultural and technical perspective which encompasses the four subsystems previously described. The two major components are joint optimization and interdependence/interaction. Joint optimization and interdependence/interaction relate to how the four subsystems interact. Joint optimization implies there is an optimal interaction between the four subsystems and interdependence/interaction implies changes in one subsystem impacts the outcomes of another subsystem (Hendrick & Kleiner, 2005). Joint optimization describes how optimization of outcomes only takes place when considering social and technical aspects, which includes all four subsystems (Trist, Higgin, Murray, & Pollock, 1963; Kessler, 2013).

For this study, the joint optimization component of the sociotechnical theory related to the role that facilitated the IT project and the common factors that contributed to IT project failure. In addition, the interdependent and interaction piece of sociotechnical theory established a basis for data collection on the causes of IT project failure in public universities. Joint optimization and interdependent/interaction components of sociotechnical theory supported this research as a case study.

Project management contains a sociocultural aspect and a technical aspect that relates to sociotechnical theory. In project management, the sociocultural aspect involves the flexible piece of project planning such as leadership, problem-solving, teamwork, negotiations, and customer expectations (Larson & Gray, 2014). The technical aspect of project management contains the formal, disciplined, and logical side of managing a project, such as scope, work breakdown structures, schedules, resource allocation, baseline budgets, and control measures (Larson & Gray, 2014). According to sociotechnical theory, joint optimization of project management practices takes place when considering both the social and technical aspects.

Another central component of the sociotechnical theory is the interdependence of the social and technical aspects in conjunction with the environment (Trist, Higgin, Murray, & Pollock, 1963; Kessler, 2013). Project management uses the consideration of interdependence to adapt its core principles to facilitate various types of projects in the best way possible. Pinto and Slevin (1988) conducted extensive research in the private sector to assess and measure critical success factors for the successful completion of projects. This research led to the development of a ten-factor model of the project implementation process to increase project success rates. Rosacker and Olson (2008) conducted research that addresses problems in the public-sector implementation of projects; this research focused on IT project management. The findings of this research suggested there are significant differences in critical success factors between private- and public-sector IT projects. In this instance, applying sociotechnical theory to this qualitative research could explain the differences in outcomes for these types of projects.

The foundation of project management is the idea of developing best practices to complete any project in any industry on time, within budget, and within scope (Larson & Gray, 2014). Research suggests that making a one-size fits all model for project implementation might not be practical nor does it solve the problem of high project failure rates for specific project types (Pinto & Slevin, 1988; Rosacker & Olson, 2008). These are the same ideas in sociotechnical theory, especially joint optimization. Joint optimization suggests that each component of the subsystem has an optimal way of working together to produce the best outcome which supports the research that suggests a one-size fits all model of project management does not solve the problem of high project failure rate (Kleiner, Hettinger, Dejoy, Huang, & Love, 2015). Meaning, if project management professionals make adjustments to subsystems within project management based on the type of project being implemented then the

project might have a reduced possibility of failure; this is joint optimization (Kwak, Sadatsafavi, Walewski, & Williams, 2015). Every project is different, so each subsystem within each project will be different; joint optimization is needed to change subsystems and negate the idea of using a one-size fits all model for project management.

This research used interviews to capture qualitative data on IT projects in public universities. The data collected related to both the social and technical aspect of project management. Social data related to what role facilitated the IT project, while the technical data related to project management practices that might be common contributors to IT project failure. From these failures, consideration of both the social and technical components of a project happens. The outcomes of this study created the opportunity for universities to use joint optimization and interdependence/interaction to have a higher success rate for IT project management in public universities by possible implementation of critical success factors or additional risk management practices for these projects.

Sociotechnical Theory

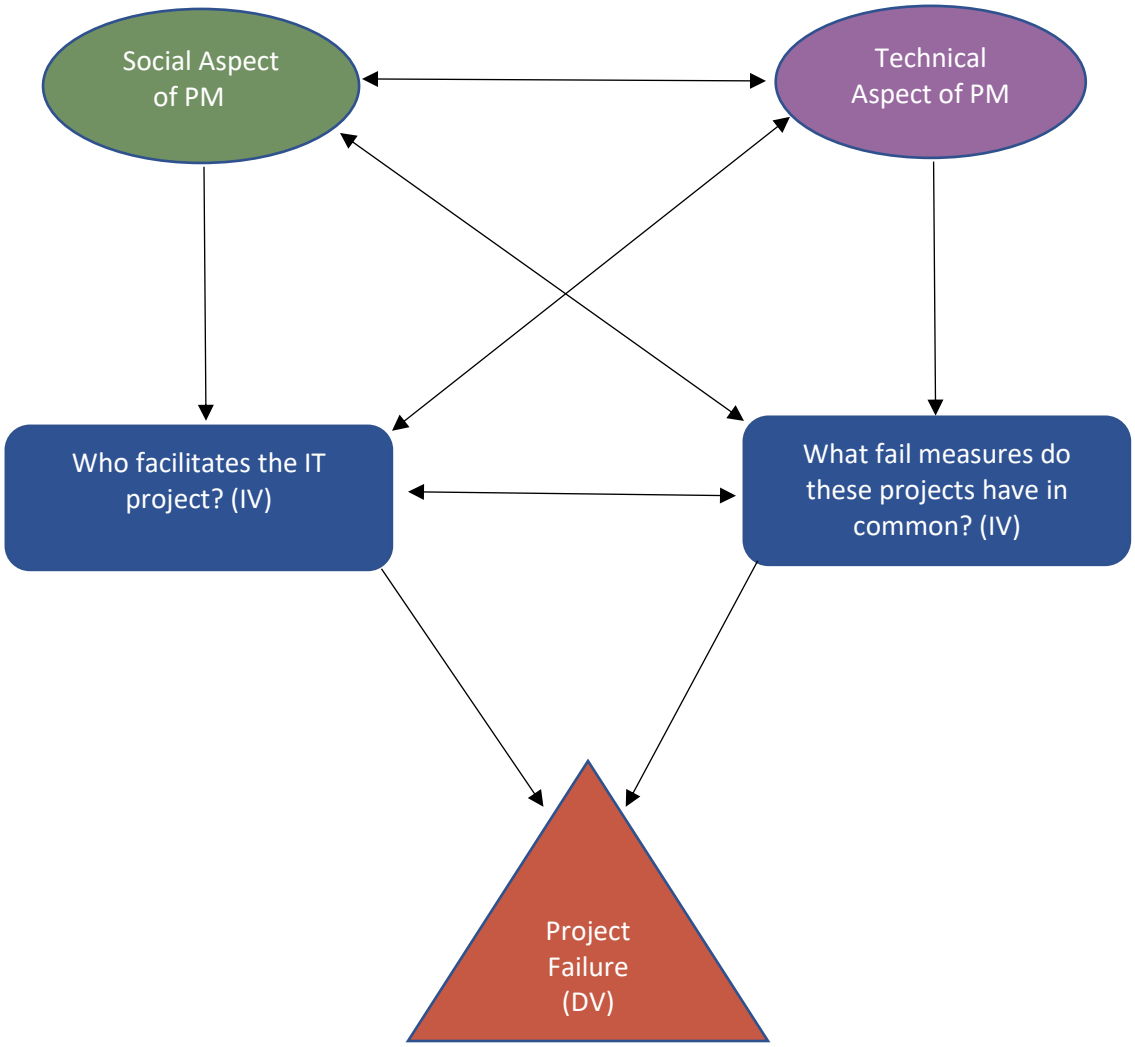

Figure 1. Relationships between theory and variables.

Terms

Higher Education. For this study, higher education and university have the same meaning.

Information Technology (IT). Information technology includes areas of computer hardware, software, various applications, and the integration of all these areas with existing computer systems (Burton, 2011).

Information Technology (IT) Project Deliverables. The specific IT outputs or results from an IT project activity. Deliverables can include prototypes, documentation, software, decisions, and approvals. Deliverables are tangible, measurable accomplishments that take place during the project process (Thamhain, 2005).

Private Sector. The sector of the economy that private citizens own. The business can be a sole proprietor, limited liability corporation, partnership, or corporation, but is not limited to one of these business types (Mazzucato, 2015).

Project. A temporary task that should be completed within a certain period of time, within a particular budget, and delivering a particular outcome to the stakeholders (Parker, Parsons, & Isharyanto, 2015).

Project failure. A failed project is one that was completed but did not meet all the requirements of the stakeholder, was over budget, or was not finished by the scheduled deadline (Chandler & Thomas, 2015). Meaning, the project did not satisfy the triple constraint (Bronte-Stewart, 2015). Also, a failed project is one that was abandoned or canceled before completion (Marnewick, 2012).

Project Management (PM). The application of knowledge, skills, tools, and techniques to project activities to meet project requirements (Project Management Institute, 2013).

Project Management Body of Knowledge (PMBOK). The PMBOK covers project management, program management, portfolio management, and the organizational approach to

project management (Project Management Institute, Inc., 2018). The PMBOK provides the foundation for project management knowledge.

Project Management Institute (PMI). The PMI was founded in 1969 to bring together project management professionals and provide them with resources to advance individual careers in this area (Project Management Institute, Inc., 2018).

Project Management Professional (PMP). The certification issued by the PMI. Individuals who take this certification exam should have a secondary degree, 7500 hours of leading projects, and 35 hours of project management education or a four-year degree, 4500 hours of leading projects, and 35 hours of project management education. In addition to passing the exam of 200 multiple-choice questions, individuals must continue professional development to maintain the certification (Project Management Institute, 2018).

Project Manager. For this study, a project manager was one who has the title of project manager or who leads projects as a regular part of daily work.

Public Sector. The portion of the economy that is run by the government. The government might be local, county, state, or federal governments (Stiglitz & Rosengard, 2015).

Successful Project. Successful project completion occurs when the budget, scheduled deadline, and project deliverables happen within the set parameters of the project (Young, 2016).

Triple Constraint. The project scope, project budget, and project time (Teixeira & Pereira, 2015).

University. A post high school institution that offers associates, bachelors, masters, and/or doctoral degrees.

Assumptions

In this study, there were assumptions regarding items that were out of the control of the researcher; this included outliers such as individuals providing information about the IT projects included in this study, how the project implementation was approached, and where IT projects in higher education fit into current research about public sector IT projects. In the following paragraphs, these assumptions and the position of the researcher are discussed.

This study assumed that the individuals involved in implementing IT projects in public universities were striving to do so on time, within budget, and within scope; that is, the professionals involved in the projects were striving to complete the project successfully (Young, 2016). It is also assumed that the common causes of IT project failure discovered in this study were not because of the project manager's intentions but because there were elements of project implementation that were overlooked in the project planning process.

In the public sector, common causes of IT project failure include ineffective project management practices and unrealistic planning (Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016). In this case, the public sector means any organization that is operated by a government entity at the local, county, state or federal level. The research conducted by Anthopoulos, et al. did not explicitly mention public universities; therefore, another assumption of this study is that the research conducted by Anthopoulos, et al. did not include information about public universities.

Finally, this study had an assumption that applied to the execution of this research. The assumption was that the Director of Information Technology, Manager of Information

Technology, or Chief Information Officer at the university who participated in the interview process were knowledgeable of the IT projects implemented at the university.

Limitations

Project management spans many industries. Therefore, one limitation of this study was that the primary focus was on IT projects conducted at public universities in Oklahoma. This study encompassed 27 public universities that used project management principles. There are many private and public entities that use project management principles; therefore, this study only captured a small sample.

Another limitation of this study was the limited amount of prior research about IT projects in public universities. Much of the literature review revolved around project management practices and IT project management practices, but these were not specific to public university IT projects. The researcher applied the general project management topics to the narrow area of public universities; this might not be an entirely accurate representation.

The final limitation of this study was the researcher's access to the people within the public universities. Gaining access to those who knew details of past IT projects within that university might limit the number of responses received. For IT projects implemented several years ago, finding personnel familiar with those projects might prove difficult.

Delimitations

The scope of this research covered only failed IT projects implemented in public universities. The researcher only considered two-year or four-year public universities in Oklahoma. All other educational institutions were excluded.

Significance of the Study

Reduction of Gaps

The Project Management Institute (PMI) established standardized processes for project management practice, but project implementation is not identical among projects, and many projects do not have a successful outcome. For IT projects, the failure rate is higher when compared to other types of projects (Keil & Mahring, 2010). Many times, IT projects involve a level of complexity that other projects do not have which contributes to the high failure rate (Daniels & LaMarsh, 2007).

There is a gap in the research about why IT projects fail in public universities. New approaches to managing IT projects are needed to overcome the high failure rate in all IT projects (Ramaswamy & Dawson, 2014). This research filled that gap through identification of common factors that contributed to project failure in public universities and provided information about what role facilitated the IT project.

There is research that addresses reasons for IT project failure in both the private and public sector, but this research does not address public universities as a single entity. In the private sector, common causes of IT project failure is lack of organizational learning, resistance to change, and lack of user involvement in the development process (Taylan, 2014). In the public sector, common reasons for IT project failure include ineffective project management practices and unrealistic planning (Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016). However, this information does not reflect the causes of IT project failure in public universities.

Finding common causes that contribute to IT project failure in public universities will allow the development of best practices and use of risk management to prevent these issues.

This knowledge will help institutions of higher education successfully implement IT projects, better focus resources, and save money because project completion is on time, within budget, and within scope.

There is a gap in the research about what role facilitates IT projects in public universities. This research gave context to the common causes of IT project failure by identifying what role facilitated these IT projects. Identifying the role might be significant to institutions of higher education in giving guidance about what role might be more effective at facilitating IT projects in public universities in the future.

Biblical Integration

Preventing project failure, or having a successful project outcome, is about finishing on time, within budget, and within project scope; this means managing resources wisely and getting the most benefit from every dollar invested. In a public university setting, this is especially important because the university is a steward of taxpayer dollars; it uses money from the citizens of the state to implement projects and operate.

God gives us an example of how to manage our resources in Matthew Chapter 25; Jesus tells the parable of talents. A master went on a journey; he gave his servants five talents, two talents, and one talent respectively, to manage. Upon the master's return, he found the servants who received five and two talents doubled their return, but the servant who received one talent received no return. The two servants who received returns on their talents were praised by the master. However, the master chastised the servant who received no return for their talent and told the servant he was lazy and to leave his presence (Matthew 25:14-28, English Standard Version). Matthew 25:29 says, "For to everyone who has will more be given, and he will have

an abundance. But from the one who has not, even what he has will be taken away." Jesus expects us to be wise with the resources He has given us; this includes money and time. When we prove faithful and wise with resources, then God will entrust us with more. In the context of this study, if universities became more efficient at implementing IT project, thus saving money, time, and human resources, then that university will have a higher standing with the public it serves.

In addition to using resources wisely, universities should ensure that the projects in which it invests help the university flourish and meet the needs of its students. Van Duzer (2010) described part of an organization's role was to work the fields, to cause communities to be fruitful, to create wealth, and to provide a good that enhances the quality of life (pp. 41-42). A university who invests wisely in projects and completes them on time, within budget, and within scope, certainly fulfills this creation mandate.

Finally, God set the example for how we are to work when He created the heavens and earth (Keller & Alsdorf, 2012). In Genesis Chapter One, God repeatedly created and saw that it was good. Genesis 1:31 says, "And God saw everything that he had made, and behold, it was very good." God worked, and He made sure that what He made was perfection; the garden of Eden was paradise. Therefore, regarding implementing projects, God gave us an example to follow; He expects our work to be of the best quality. Universities, along with all organizations, should strive to produce a good quality of work. Implementing a successful IT project requires quality personnel, planning, and resources. Using God's example, we should implement these elements to impact the outcome of the project positively.

Efficiently implementing an IT project means being a good steward and God called us to be good stewards of all he has given. 1 Corinthians 4:1-2 says, "This is how one should regard

us, as servants of Christ and stewards of the mysteries of God. Moreover, it is required of stewards that they be found faithful". As stewards of God, it is the responsibility of Christians in universities to use resources wisely. Developing a process to implement an IT project efficiently is fulfilling the mandate for how Christians should work. Universities should strive to reach the highest quality of work because God set the example of how to strive for excellent work. Meaning, when a university sets out to implement an IT project, it should be done to the highest standard and with as much efficiency as possible.

Literature Review

This literature review highlights the difficulties associated with Information Technology (IT) project management. This review establishes a basis for project management practice, analyze how it develops in IT projects, establish common reasons for project success and IT project success in both the private and public sectors, and review common risks involved in IT projects. Further, this literature review evaluates the value in project management certification and how certification helps both employers and employees. Finally, this review addresses higher education, changes in higher education, and the need for IT in higher education.

What is Project Management

Project management (PM) is initiating, planning, executing, monitoring and controlling, and closing all the working components of a project (Radujkovic & Sjekavica, 2017). Safely achieving the project goals, within an allotted timeframe, within an agreed budget, and meeting performance criteria upon project completion are what drives project management (International Project Management Association, ICB-IPMA, 2006).

PM and project success are vital in today's business environment (Murugesan, 2012). The project management field is different from many other fields of study because it requires a project manager to be competent in his or her area of expertise in addition to being a competent project manager (Liikamaa, 2015). For instance, to be a competent IT project manager, the project manager must be an IT subject matter expert plus be competent in the areas of project management. Learning a new skill not only means gaining knowledge, but also learning how to apply that knowledge (Mustata, Andronie, & Barbalata, 2014).

Project management includes areas such as defining the project scope, estimating project time and cost, developing a project schedule, managing project quality, and managing project risk (Larson & Gray, 2014). In each of these areas, successful management of additional components must happen which is why project managers use the project management processes set forth by the Project Management Institute. In the following sections are four areas related to defining project success, which is meeting the project budget, adhering to the project schedule, managing project quality, and delivering all items included in the project scope.

Project budget. Managing project cost includes planning, estimating, budgeting, financing, funding, and controlling monetary transactions in the project (Project Management Institute, 2017). Risk management plays a vital role in project costs. Performing risk management thoroughly minimizes possible project cost increases (Allen, Carpenter, Hutchins, & Jones, 2015). Budgeting for a project is multidimensional and requires consideration of the project stakeholders needs and limitations (Klinowski, 2017).

Top-down and bottom-up are the two ways of estimating project cost (Wilson, Mugford, Barton, & Shepstone, 2016). The top-down approach includes the Delphi Method, ratio methods, apportion methods, and the functional point method for software and system projects (Gharaibeh, 2014; Rajkumar, Raman, Balaji, & Kannan, 2017; Lo & Kuo, 2013; Jeffrey, Low, & Barnes, 1993). The bottom-up approach includes the template methods, range estimating, and phase estimating (Giammalvo, 2013; Narbaev & DeMarco, 2017; Uppal, 2003).

Project budgets are a significant concern to the stakeholder and the project manager. Not doing a proper cost estimate can lead to a misallocation of resources; to make informed decisions, project managers need to estimate costs systematically (Kabeiseman, 2015).

Project schedule. Project scheduling is a significant part of the project manager's job. The project manager must establish policies and procedures for the project schedule by: 1) Defining activities needed to produce the project deliverables, 2) Knowing which project activities are connected, 3) Estimating the amount of time for each project activity, 4) Developing a project schedule based on these considerations, and 5) Controlling the schedule while the project is ongoing (Project Management Institute, 2017).

There are various types of software available to project managers that aid in project scheduling, many that include the production of a Gantt Chart. Henry Gantt created this scheduling tool in the 1910s, and it is still used today in electronic form (Gantt.com, 2018). A Gantt chart uses a bar graph to illustrate the project's activities like when each activity starts, the duration of the activity, which activities overlap or are connected, and the start and end date of the entire project (Gantt.com, 2018).

Project scheduling entails coordination of human resources, equipment, and materials. The human resource aspect of scheduling can be challenging, especially if the project is not using a dedicated project team (Lewis, 2011). In this case, project managers might assume a team member is working on the project 50% of the time and performing regular duties 50% of the time when a team member is only working on the project 25% of the time and doing regular work 75% of the time. This type of underestimation can put a project behind schedule very quickly.

Project scope. A poorly defined project scope increases the likelihood of project failure (Cho & Gibson, 2001; Mirza, Pourzolfaghar, & Shahnazari, 2013). Gobeli and Larson (1990) found that about 50% of project planning problems were due to poorly defined or unclear project

scope. The project manager, customer, and all significant stakeholders should take part in developing the project scope.

Project managers usually employ a project scope checklist to be thorough and make sure project planning includes all tangibles. The project scope checklist includes project objectives, deliverables, milestones, technical requirements, limits and exclusions, and customer reviews (Legace, 2006).

Establishing project objectives means creating a precise definition of the customer's needs. The project objectives should answer the questions of what, when, and how much (Martinelli & Milosevic, 2016). Defining the major deliverables includes quantifying the expected, measurable outputs that take place during the project (Bhaumik, 2014). A project milestone is a significant event in the project that occurs at a specific point (Pharro & Bentley, 2016). In modern project management, the product or service produced by a project contains a technical component. Technical requirements might enhance deliverables or be part of performance specifications (Nicholas & Steyn, 2017). Defining the limitations and exclusions of the project scope ensure the stakeholders and project manager have the same expected outcomes for the project (Andler, 2016). Finally, reviewing the checklist with the customer makes all parties involved confident of the agreed-upon expectations of the project (Macharis & Bernardini, 2015).

Project quality. Quality is considered one of the top elements of a firm's competitiveness; it is usually part of the strategic operations of a company. Quality management integrates all functions of an organization to improve the quality of products and services through continuous process improvement (Nixon, 2018). The goal of quality management is to

work as a team and reduce costs while improving organizational operations. Therefore, quality should be carried over to any projects an organization undertakes.

According to Doneva, Gaftandzhieva, and Totkov (2016), the following principles are the basis for project quality:

1. Keep all deadlines and agreed upon schedules for deliverables
2. Identify and handle internal and external project risks promptly
3. Evaluate deliverables to ensure compliance with stakeholder requests
4. Evaluate critical project activities to ensure proper organization, high level of effectiveness, and a high level of quality. (p.30)

Practical quality management tools are needed early in project phases (Mikkelsen, 1990). Addressing quality management early in project phases increase the likelihood of project success and stakeholder satisfaction (Liu, Kane, & Bambroo, 2006).

Project Management Processes

Project management has a formalized body of knowledge, but there is still much room for improvement in the processes involved in project management (Johnston, 2014). Project management processes help project managers follow through on projects efficiently from beginning to end (Project Management Institute, 2013). Project management processes also provide techniques for project managers to apply knowledge and skills in various areas of project management. Communication with stakeholders and managing relationships with stakeholders are vital areas in the project management process.

Stakeholder communication. Kappelman, McKeeman, and Zhang (2007) stated that communication is one aspect that contributes to project failure. According to the PMI (2017),

communication should be a top priority in a project. The PMBOK (2017), identifies communication planning, managing, and monitoring as integral parts of communication management. Monteiro de Carvalho (2014), investigated the role of communication in IT project management and stated, "project success had different meanings to stakeholder expectations and what had led to project failure" (p. 39). Identifying stakeholders early in the project planning process is a critical point of project communications (Monteiro de Carvello, 2014).

Although project communication is a soft skill in project management, it is necessary to acquire. Communication has different media; it might be expressive, direct, indirect, verbal, or non-verbal and context affects how information is perceived (Edmondson, 2009). Content, the attitude of the communicator, and body language are essential during information exchange (Zemguliene, 2012). A project manager with little experience might have difficulty communicating through the different layers of a project. Training is necessary if a project manager does not possess the soft skills needed for effective communication.

Meeting stakeholder needs and expectations. A project manager must recognize the importance of successfully managing project stakeholder expectations; this is vital to a successful project outcome. Achieving project deliverables that fully meet stakeholder expectations is a skill that requires attention and development; it is a soft skill that a project manager needs (Bourne & Walker, 2004). Because this is a soft skill, managing expectations of project stakeholders is a challenge. To meet stakeholder expectations, project managers need to have superb soft skills; this will enable them to lead, solve problems, communicate, and negotiate as needed throughout project execution (Schwalbe, 2013).

Not engaging project stakeholders shows a lack of leadership (Kee & Newcomer, 2008). A project manager not leading well could result in the project stakeholder's requirements, such as scope and schedule, not being met which results in project failure. PMBOK (2017), states that engaging project stakeholders early in the project can be the difference between project success and failure.

Project Management Certification

A project manager controls the trajectory of a project and all aspects of project implementation. There are as many different types of project managers as there are personality and leadership types. Project management in modern organizations is a difficult task and must consider the nature of the project, human resources, corporate culture, and experience among project team members (Mala, Bielik-Marettova, & Cerna, 2012). To do this effectively, project managers go through various career stages which usually include receiving a certification.

Project Management Professional (PMP). The Project Management Institute developed the Project Management Professional (PMP) certification in 1982; the board of directors approved it in 1983. PMP exams were administered beginning in 1984 and were made up of 320 multiple choice questions from eight project management areas (Stretton, 2007). In 1996, the first edition of the PMBOK was published. This book represented the collaboration of project management professionals across six areas of project management. The PMBOK has published several editions since then, and project management professionals frequently use it as a point of reference for various types of projects. Project management professionals not only use the PMBOK as a guideline for managing projects, but also for studying for certification. Becoming a PMP has excellent benefits, current data shows that the median income for a

certified project manager across the United States is $111,000 and the median income for a non-certified project manager is $91,000 (Project Management Institute, 2017).

Becoming a PMP is a resume builder because of the rigor involved in becoming certified. The PMP is the most highly recognized project management credential (Bredillet, 2010). A PMP candidate with an associates degree or less is required to have 7,500 hours of leading projects and 35 hours of project management education. A PMP candidate with a baccalaureate degree (or higher) must have 4,500 hours of leading projects with 35 hours of project management education. All PMP candidates must pass a 200-question exam and continue professional development upon certification (Project Management Institute, Inc., 2018).

Being committed to becoming a certified PMP is a significant decision that leads to the mastery of knowledge, skills, and experience (Starkweather & Stevenson, 2011). The certification exam tests the real-world experience that a PMP candidate possesses against the areas of knowledge referred to in Table 1. Table 1 presents a breakdown of the areas covered by the PMP exam. Also, Table 1 shows what percentage of question pertains to each area on the PMP exam.

Table 1

Breakdown of Project Management Professional Areas of Questions

Domain	Percentage of Questions
Initiation	13%
Planning	24%
Executing	30%

Monitoring and Controlling	25%
Closing	8%

The PMP credential is accredited internationally by the American National Standards Institute (ANSI). The ANSI represents the United States in the International Organization for Standardization (ISO). The ISO uses experts to share knowledge and develop relevant, consensus-based standards for various operations. The accreditation process through the ANSI is rigorous, which lends validity to the PMP certification (ANSI, 2018).

PMP certification has grown exponentially over the years. In 1993, there were approximately 1,000 PMPs, and as of March 2018, there are 833,025 PMP certified individuals (Project Management Institute, Inc., 2018). PMP certifications are expected to continue to grow.

Certified Associate in Project Management (CAPM). A CAPM aims to recognize an individual's knowledge of the project management field from a global perspective. The pre-requisites for taking the CAPM exam are a secondary degree and 1,500 hours of project experience or 23 hours of project management education (Project Management Institute, 2018). Maintaining the CAPM requires a re-take of the exam every five years. The CAPM exam has a three-hour time limit and includes 150 multiple choice questions. Receiving the CAPM credential is useful for college graduates in the project management field who wish to set him- or herself apart in the competitive job market (Frame & Sawle, 2017).

The CAPM is a valuable, entry-level certification for project managers. Benefits of the CAPM include additional educational opportunities for employees in the project management profession, a quick rate of return for organizations, and increased competitive standing among

peers (Kerzner, 2014). The military also helps officers and non-commissioned officers receive the CAPM to cement project knowledge for engineers. The CAPM certification is valuable to the military while soldiers continue to serve and help the soldier transition into a civilian career upon ending time in service (Butler, 2014).

Information Technology Project Management

For an organization to remain competitive, it must be able to execute organizational processes using IT (Anand, Wamba, & Ganzou, 2013; Huffman & Whitman, 2015). IT project management is different from standard project management, particularly in the following areas:

1. The goals of an IT project are not easy to precisely define in comparison to other project types.
2. IT projects tend to lack clear boundaries. Will the IT product need to interface with existing systems or is a combination of stand-alone and integration taking place?
3. Change requirements might happen because work continues on the old system while creation and installation of the new IT system take place.
4. Interfacing IT components is complex.
5. IT projects are inherently more risky than other project types because most people have little or no experience using the new technology.
6. Manager expectations are sometimes unrealistic for IT projects.
7. Implementation of new technology usually impacts many aspects of the organization; there is an increasing dependence on technology projects so an IT project failure can affect many business operations.
8. When implementing new and old technology, there are many gaps between technologies. (Lientz & Rea, 2011, p.7)

These areas are growing because of changing trends in organizational operations. There are considerable differences in IT projects versus standard projects. These differences need to be addressed by the project manager. As IT becomes increasingly important in organizations, recognizing and developing best practices that lead to successful implementation of IT projects are a necessity (Rosacker & Rosacker, 2010).

Information Technology Project Management in the Private Sector. IT project management in the private sector is affected by the following conditions:

1. The private sector is highly competitive which creates pressure to do projects quickly and efficiently
2. Managers in the private sector are accountable to shareholders, clients, and other stakeholders
3. In the private sector, managers navigate closely-related business processes; this relationship is more complicated in the public sector
4. Planning projects in the private sector are highly focused on internal coordination and meeting strategic goals
5. Private-sector IT managers are usually high-ranking in the organizational structure. (Bretschneider, 1990; Cats-Baril & Thompson, 1995)

Information Technology Project Management in the Public Sector. Public sector IT project management is affected by the following:

1. The public sector does not have to worry about competition. Therefore cost overruns and efficiency are less important
2. The public sector is accountable to many constituents, but there are no immediate repercussions for a failed IT project

3. The public sector usually has more strenuous regulatory requirements than the private sector
4. In the public sector, relationships between functional departments are different which can cause complications for IT projects
5. IT functionality in the public sector must link with things outside the organization because it is typically serving the public
6. IT managers in the public sector are not usually high-ranking in the organization structure. (Bretschneider, 1990; Cats-Baril & Thompson, 1995)

Utilization of IT project management in the public sector happens in much the same way as in the private sector. Mismanagement of resources is a significant issue with IT projects in the public sector, and the process is inefficient in achieving goals for the public entity's operations (Powner, 2008). Public sector IT projects suffer from being over-budget, over the scheduled project time, and fail to produce the functional requirements needed for completion (Obeidat & North, 2014). Operations in the public sector are different than in the private sector, so it is reasonable that public sector implementation of IT projects is different from the implementation in a private organization. Public sector agencies are large and require a significant investment in IT; future research is necessary to implement these IT projects effectively (Bretschneider, 1990; Cats-Baril & Thompson, 1995; Schwalbe, 2010).

Reasons for IT Project Failure

IT project management functions in much the same way as standard project management; it seeks to provide guidelines for managing the cost, schedule, and time to meet project goals and objectives (Fonseca et al., 2017). IT resources are an essential component of organizations because, if allocated correctly, it can lead to higher productivity and ultimately a competitive

advantage (Nan & Tanriverdi, 2017). Even though there have been significant advances in the technology and management of projects, IT projects still have an extremely high failure rate (Hidding & Nicholas, 2017; The Standish Group, 2015; Keil & Mahring, 2010; Adam & Danaparamita, 2016). Therefore, it is vital to look at underlying reasons for IT project failure.

Project scheduling. Project scheduling is one item that contributes to the high failure rate of IT projects. A project manager must develop an achievable baseline schedule to set the foundation for project success (Prater, Kirytopoulos, & Ma, 2017). Many times, IT projects fail because baseline schedules are under-estimated, not because of poor project performance (Eizakshiri, Chan, & Emsley, 2015). In the case of project scheduling, optimism bias is accepted as a significant cause of poor project scheduling and therefore project failure. Optimism bias is the belief that the future will be much better than the past and the past is not a predictor of the future (Thuraisingham & Lehmacher, 2016). In project management, optimism bias causes project managers to produce baseline schedules and budgets that are too rigorous to possibly achieve (Prater, Kirytopoulos, & Ma, 2017).

Scope creep. Scope creep is another issue that contributes to the high failure rate of IT projects. Many businesses try to take a new system and make it fit every business practice that is currently in existence (Swartz & Orgill, 2000). Often, business practices are outdated because they have evolved over the course of many years. Under these circumstances, implementing a new system is problematic because the list of what it needs to accomplish grows to incorporate both old and new operations. Employees contribute to this problem by requesting functionality from the old system that might be out of date.

Lack of project definition. Lack of a precise project definition also contributes to the high failure rate of IT projects in higher education. In higher education, there are many working

parts and data are enormous (Daniel, 2015). Administrative operations, student needs, and faculty and advisor needs are all areas that IT in higher education must address, and each of these areas is multi-faceted. Because of this, IT projects in higher education sometimes have an unclear definition of the requirements for the new system (Kubilus, 2016).

Complexity. Complexity is another component that contributes to the high failure rate of IT projects. For many years, a critical dimension of many projects has been complexity (Baccarini, 1996). The complexity of IT projects is usually related to the high level of uncertainty involved in these projects. Uncertainty revolves around the need for rapid technology change, volatility of the need for online courses and other online capabilities for students, and investing in online teaching capabilities (Oslington, 2004).

Lack of end-user involvement. Lack of end-user involvement in the defining phase of an IT project is another cause for IT project failure (Procte & Businge, 2013). Involving users in defining an IT project leads to improved quality of the system, an increase in user satisfaction, and the reduction of expensive and useless features (Abelein, Sharp, & Paech, 2013). These factors contribute to the completion of the project being on-time, on-budget, and including the needed scope.

What is Project Success

For public universities, it is imperative to understand the many benefits of successfully implementing an IT project. Doing so provides a direct benefit to students, faculty, administrators, taxpayers, and private citizens who fund university operations. According to Sampietro and Villa (2014), the following are different perspectives for evaluating project success:

1. Evaluating project success from the contractual point of view, meaning did the results meet the contractual requirements
2. Evaluating project success from a commercial point of view, meaning what was the level of customer satisfaction
3. Evaluating project success from an economic point of view, meaning what is the profitability of the project for the organization doing the project
4. Evaluating project success from a relations point of view, meaning what was the level of collaboration by the project team
5. Evaluating project success from the business point of view, meaning recognizing benefits generated by the project (p.21).

Viewing project success from each of these perspectives means considering different areas that ultimately define the success of the project.

In addition to these perspectives of project success, there are also different views on project success according to owners and stakeholders. Turner (2004), viewed owner involvement as critical and created four success conditions reflecting that premise. The conditions are:

1. Project owners should determine success criteria for specific projects and set milestones for success; a review of these factors should happen throughout the project
2. A working relationship and collaboration between the project owner and project manager should make the project a partnership
3. The project owner should give the project manager flexibility to address problems or any unforeseen issues that arise
4. The stakeholder should maintain an interest in the performance of the project (p.350)

Turner (2004) emphasized that these conditions must be simultaneously present to gain project success.

Research conducted by Davis (2014) showed that stakeholders, not just owners, viewed project success factors differently. These success factors were as follows:

1. Cooperation/Collaboration/Consultation/Communication
2. Time
3. Identifying/agreeing on objectives/mission
4. Stakeholder satisfaction – quality
5. The finished product is useful
6. Cost/budget
7. Project manager competencies and focus
8. Deliverance of strategic benefits
9. Top management support/executive commitment (p.197)

The stakeholders in this research were the project manager, client, owner, user, and project team.

In modern project management, sustainability is considered part of project success. Even though projects have a definite begin- and end-time, the effects of a project are long-lasting. In the past, project success focused on delivery at project completion; sustainability encourages project managers to look past project completion and consider what happens when the project goes into use. To accomplish this, Matlzman and Shirley (2016), recommend addressing risk and including triple-bottom line, or longer-term, concerns. Meaning, the project manager recognizes how the project contributes to the organization but also recognizes the impact on the surrounding environment, including the ecological and social environment (Tinoco, Sato, &

Hasan, 2016). Instead of the project manager focusing on the work breakdown structure within the project, the project manager uses economic, ecological, and social factors to determine use and disposal packages instead of just work packages (Maltzman & Shirley, 2010).

The traditional view of project success is delivering the project on time, within budget, and with expected functionality (Mukerjee, Prasad, & Rao, 2017; Sai Nandeswara Rao & Jigeesh, 2015; Tinoco, Sato, & Hasan, 2016). However, there is expansion in the definition of project success; today, the definition of project success depends on the organization doing the project, the project manager, and the type of project undertaken. Even though there is much research in this area of project management, there are still no clear lines for defining project success (Hussein, Ahmad, & Zidane, 2015).

Information technology project success. Individuals play an essential role in the process of technology adoption because user adaptation is critical. Capability, timeliness, costs, avoiding risks, and quality are all paramount when organizations invest in IT development (Amin, Kamal, & Sohail, 2016). The dependence on IT has increased exponentially. Therefore, IT project success is more important than ever (Fayaz, Yasir, ul Amin, & Khan, 2017).

Adopting IT is beneficial and provides a way for organizations to have better accountability and control (Yang, Chen, & Wang, 2012). Knowledge management plays a significant role in the IT an organization chooses to adopt because it provides a way to share and access knowledge from various sources (Whyte & Lobo, 2010). There is much research that indicates knowledge management is a source of competitive advantage (Meihami & Meihami, 2014; Martin-de Castro, 2015; Lee, Foo, Leong, & Ooi, 2016). Therefore, it is reasonable that IT project success might depend on how well an organization executes knowledge management.

IT project success rates are still low (Hidding & Nicholas, 2017). The Standish Group (2015), reported that only 29% of IT projects were successful regarding project time, budget, and scope, so there is much work needed in this area of project management. There are some critical success factors in delivering successful IT projects such as: the right leadership, a well-rounded project team, interactive behaviors, making valuable decisions, individual effectiveness, communication skills, emotional intelligence, collaboration skills, and the overall ability to plan and control (Long, 2016). Aligning these factors within the project will positively impact project success. Elaboration of some of these project success factors is in the following section.

What Impacts IT Project Success?

The literature reveals a multitude of areas that influence project success. These areas include: the project manager being a subject matter expert, project team communication, organizational culture, project manager leadership style and competencies, stating the project mission, upper management support, project scheduling, the deliverables, the project team, monitoring and feedback, and risk management. Discussion of each area is in the following sections.

Subject matter expert. An IT project manager does not require the same skillset as a construction project manager. Although both professionals must know how to manage projects, one needs to have in-depth knowledge in the IT field, the other needs to have in-depth knowledge in the construction field. According to Shiner and DuPriest (2012), one of the biggest mistakes for an IT project is not involving a subject matter expert (SME).

A benefit to using SMEs is the value he/she can add to the project; they give essential guidance and project-specific expertise when there are problems in the project (Waxer, 2012).

Also, SMEs are familiar with industry best practices; this increases the likelihood of project success (Kermanshachi, Bac, & Anderson, 2016).

Communication. Developing a project communication plan is vital to project success; poor communication is a contributor to project failure (Browne, Dreitlein, Ha, Manzoni, & Mere, 2016). Murugesan (2012), said the following about communication:

> It is very important to keep the 20 communication channels open to all the project stakeholders and to periodically update them on the project progress status. This is a major responsibility of the project leader to keep the customer or the project sponsor satisfied. In such an environment, a butterfly effect once created will amplify and magnify to cause great positive ripples that will sail through in making even greater organizational changes not only to benefit the concerned organization but the industry and the country at large. (p.334)

There are two aspects of the communication system in a project; they are communication between the project manager, team and stakeholders, and communication within the project team (Kisielnicki, 2011). Communication between the project manager, team, and stakeholders means creating a project communication plan. The communication plan addresses the following:

1) When collection of information takes place

2) Who will receive that information

3) What methods are used to gather and store information

4) Who has access to information; are any restrictions needed

5) When will information be communicated, and

6) How will information be communicated (Larson & Gray, 2014).

This communication aspect of project management is closely related to the risk management component of project management. Developing a communication plan that addresses each of these areas is a must for a project manager.

Communication within the project team is essential because poor communication can lead to problems on the project. Often in IT project management, project team members do not have a prior history of working together which can make the communication aspect more difficult thus establishing its importance (Reed & Knight, 2013). Also, a project manager must possess excellent communication skills in the event of a crisis; how a project manager communicates in this situation can make a project team stronger or result in it being dismantled (Michael, Prince, & Chacko, 2016).

In construction projects, there is a high occurrence of conflict because of the many inter-working parts of people from different skill areas. For instance, electricians, plumbers, and structural workers all must work together. Research shows that a formal communication process in construction projects is positively related to project success (Wu, Zhao, & Zuo, 2017). In IT projects, there are also many working parts especially if the project involves integration with current technology. Furthermore, Browne et al. (2016) recognize communication as one of two critical success factors in project management. Based on this information, linking communication and project success is viable in any industry, including IT.

Organizational culture. The culture of an organization has an impact on every functional department. Developing an organizational culture depends on the employees within the company (Viltard, 2014). Du, Liu, Bao, and Huang (2013), discovered that cultures impact organizational values which impact how a business operates. Organizational culture affects how employees interact with each other, how managers interact with employees, and how operations

drive the organizational strategy (Kinicki & Fugate, 2018). In the modern business environment organizations must be flexible and ready to change.

Often, change management uses project management. According to Griffin, Phillips, and Gully (2017), there are four areas in which pressures for organizational change appear most frequently. Those areas are people, technology, information processing and communication, and competition. In people, change occurs through diversity; who makes up the workforce continually changes. In technology, change happens rapidly from software integration to changes in performing daily organizational processes. In information processing and communication, organizations strive to be a learning organization which impacts information storage and dissemination. In competition, change occurs through new product development or updated manufacturing processes. For an organization to be willing to change, there must be a culture of change throughout the organization. Research shows that there is a significant relationship between organizational culture and employees' readiness to change (Dhingra & Punia, 2016). If employees are willing to change, the organization can change, and project implementation of organizational change could be a success.

Research indicates that project implementation that supports the project but also models the organizational culture impacts project success (Kendra & Taplin, 2004). How a company manages risk overall is a factor in this research. Meaning, if an organization views risk management as an important part of normal business operations, then it will also view risk management as an important part of a project. An organization benefits when knowledge is part of the organizational culture and recognized in all business operations (Nevo, BenBasat, & Wand, 2012), this means projects will benefit from this aspect of organizational culture as well.

Anderson (2013), researched specific organizational cultures in various projects. The results showed significant differences in organizational cultures and the types of projects chosen. Chandrasekara, Linderman, and Schroeder (2015) researched companies who performed research and development projects. It showed that companies who do research and development tend to have an organizational culture based on learning and knowledge. Finally, research conducted by Drob and Zichil (2013), used the project management guidelines from the Project Management Institute and considered the culture of the organization implementing a project. Then Drob and Zichil (2013) gave a probability of project success based on matching the type of project to the organizational culture. In these research examples, project success is dependent on organizational culture.

Project manager leadership style. Effective leadership plays a critical role in organizational performance (Asencio, 2016; Jing & Avery, 2016) which includes project execution. According to Goleman (2000), there are six prominent leadership styles. They are 1) coercive leaders, 2) authoritative leaders, 3) affiliative leaders, 4) democratic leaders, 5) pacesetting leaders, and 6) coaching leaders. In addition to these types of leadership, Northouse (2013), gives four more broad categories of leadership style. They are transformational leadership, servant leadership, authentic leadership, and team leadership. The leadership styles provided by Goleman (2000), can be placed into one of these four broad categories. The following paragraphs describe each type of leadership style.

Coercive Leaders. Coercive leaders require team members to be obedient and loyal rule followers. Team members receive explicit instruction regarding how the task should be completed (Giltinane, 2013). This type of leadership does not take into consideration other's perspectives in a work environment which can be damaging in a project environment (Jhatial,

Jariko, Tahrani, & Jam, 2013). There are times when it is necessary for a leader to take charge and make difficult decisions; however, in a project environment, it is good to seek input from team members about various aspects of the project. Coercive leadership is not conducive to proper project management and can be detrimental to team member morale (Lloyd, 2007).

Authoritative Leaders. An authoritative leader takes responsibility for identifying and solving problems; however, this is not a leader who commands employees to follow. Instead, an authoritative leader sets the overall goal but gives employees the freedom to choose how the goal is met (Goleman, 2000). A leader that uses this method can efficaciously facilitate a project team because this approach says, "we are all in this together." Even though the leader identifies the goals, team members have ownership because they know how their actions will help achieve the goal. This type of leadership conveys trust to the project team members and their ability to complete the task at hand (Pettigrew, 2014).

Affiliative Leaders. Affiliative leaders put people first, which tends to create harmony and boost morale (Goleman, 2000). This type of leadership is not always useful when working with project teams because the focus is on the team members, not the task. One specific problem with this type of leadership is the focus on positivity in the workplace; a project manager might fail to give useful feedback when it is negative (Preston, Moon, Simon, Allen, & Kossi, 2015). In a project setting, team members need feedback, whether it is good or bad; however, this type of leadership tends to overlook the latter. Research indicates that affiliative leadership is negatively related to effective leadership (Do & Minbashian, 2014). An affiliative leader gives much consideration to employee's feelings in the decision-making process. In a project setting, the primary focus should be completing the task on time, in the budget, and scope. The outcome to the stakeholder is of primary importance, not the project team member's feelings.

Democratic Leaders. The democratic leadership style focuses on giving employees a voice in business operations where team members feel valued and essential in achieving project goals (Giltinane, 2013). This type of leader tends to increase morale, create a harmonious work environment, contribute to the flexibility of the organization, and help generate innovative ideas. Because democratic leaders involve team members in decision-making, there is greater engagement and therefore increased job satisfaction (Bhatti, Maitlo, Shaikh, Hashmi, & Shaikh, 2012). A downside to democratic leadership is that it requires a significant amount of other people's time because it requires meetings and collaboration to gain input from others (Cunningham, Salamone, & Wielgus, 2015).

Pacesetting Leaders. A pacesetting leader is driven and focuses on task completion, not the people who must achieve it (Kasapoglu, 2014). A pacesetting leader has high expectations for team members and him- or herself and is obsessive about reaching goals. This type of leader expects extraordinary performance from everyone with whom they work (Goleman, Boyatzis, & McKee, 2002). Pacesetting leadership is excellent to use at the beginning of a project because this type of leader quickly produces results (Money-zine, 2018). Because of the high standards expected, poor performers do not function well under the demands of a pacesetting leader.

Coaching Leaders. The coaching leadership style helps employees develop and meet long-term objectives by seeking to improve every task attempted (Cunningham, Salamone, & Wielgus, 2015). Coaching leaders challenge employees to reason through problems, think for themselves, and develop solutions, all while being supportive (Berg & Karlsen, 2016). Coaching leaders guide the coachee but do not supply answers. A coaching leadership style is useful for people who are innovative and self-starters; this is suitable for project settings. In project management, a coaching leader will let team members go through the decision-making process

and make decisions. However, the coaching leader will be ever present to guide the project team in the right direction. Coaching leaders encourage team members to identify strength and weaknesses to improve performance and decision-making (Kasapoglu, 2014).

Transformational Leaders. A transformational leader inspires team members and provides intellectual challenges (Maqbool, Ye, Manzoor, & Rashid, 2017). This type of leader seeks to help employees develop into leaders. Transformational leaders have high expectations of team members but also empower the team through daily tasks. If implemented correctly, transformational leadership can motivate employees to exceed performance standards and set themselves apart because of their dedication to the organization. Research suggests that transformational leadership is effective in a project team environment (Tabassi, Roufechaei, Abu Baker, & Yusof, 2017). There are four standard components to transformation leadership. They are: 1) idealized influence, 2) inspirational motivation, 3) individualized consideration, and 4) intellectual stimulation (Bass & Riggio, 2006).

Servant Leaders. A servant leader focuses on developing employees in the area of self-motivation, community stewardship, task effectiveness, and future leadership capabilities (Mahembe & Enbelbrecht, 2014). This leader's act of service motivates team members to follow them and perform well (Greenleaf & Spears, 2002). A servant leader puts the interests of followers above self-interest, this presents the leader as humble, and that humbleness propagates the relationship with followers; in turn, followers become fully engaged in his or her work (Greenleaf, 1977; Liden, Wayne, Chenwei, & Meuser, 2014). Servant leadership is a trait that usually leads to legitimate power, and a person with legitimate power has no problems getting employees to follow.

Servant leaders have a positive impact on the work environment (Ozyilmax & Cicek, 2015). Research conducted by Chanhoo, Kawangseo, and Seung-Wan (2015), indicates that servant leadership also has a positive impact on team performance, especially in the area of knowledge sharing. Also, research by Liden, Wayne, Chenwei, and Meuser (2014), indicates that servant leaders increase job performance of team members, increase creativity, and increase customer service behaviors; all of which can positively impact a project.

Krog and Govender (2015), conducted a study on servant leadership in project management. The analysis was conducted on a sample of surveys from 48 project team members out of 257 submitted surveys. The outcomes concluded that for a project to be a success the project team leader must have the right leadership style and management skills. The results of this study indicate that project management leaders who adopt the qualities of a servant leader have a positive correlation to high performing project teams and expected project outcomes.

Authentic Leaders. Authentic leadership relates to emotional intelligence. Some adjectives used to describe an authentic leader are conscientious, competent, confident, and well-rounded (Fusco, O'Riordan, & Palmer, 2015). Authentic leadership is more than a specific company or context, it is a way of living life. An authentic leader is mindful of the present but also considers how current operations will affect the project, and how the project will affect the future of the organization. Authentic leaders begin work by leading for the present, and as his or her tenure grows, leads so that there is a perfect project outcome and the future of the organization will be healthy (George, 2003). Authentic leaders are able to make the hard decisions without considering the popularity of their choice (Alavi & Gill, 2017).

There are many types of leaders, more than those in the above paragraphs. Most people in leadership positions are not just one type of leader but will have a dominant or default leadership style. When it comes to decision-making, leadership style can have a considerable influence on information flow, openness of discussion, employee morale, and the ability to look at facts over feelings (Keeney, 1994). After considering these elements, the difficult task is making decisions so that a project has the best possible opportunity for success.

Top management support. When company executives are not supportive of IT projects, the likelihood of poor project outcomes increases (Robinson, 2017). The lack of top management interest, understanding, alignment, and integration in IT projects contributes to the high failure rate of IT projects (Reich & Benbasat, 2014). According to Engelbrecht, Johnston, and Hooper (2017), 39% of the variance of IT project success is accounted for by the business managers' IT capabilities and knowledge.

Murugesan (2012), researched how management might facilitate project success. He found the following:

> When a leader focuses on changing the underlying culture to one of high trust rather than just demanding improvement in the performance indicators, motivation, and morale improved in leaps resulting in huge improvement in project progress and the environment at the workplace. (p. 334)

Managers must lead the way in projects as well as in regular business operations by focusing on creating culture, not just performance. When this happens, it improves the environment in which employees operate which automatically improves performance. This type of support in a project will make a positive impact.

The findings of research conducted by Ahmed and bin Mohamad (2016) imply that the provision of resources, communication, expertise, power, and structural

arrangements all have a significant positive relationship with project success. However, top management facilitation in these areas furthers the likelihood of high project performance and success.

Project team. A competent, prepared, and motivated team is key to project success (Toledo, 2013). There is significant research on the characteristics of a high-performance project team. Cheruvelil, Soranno, Weathers, Hanson, Goring, Filstrup, and Read (2014) suggest interpersonal skills and diversity are fundamental to a project team. Solis, Sinfield, and Abraham (2013) suggested an impressive project team possesses positive attitudes and necessary competencies and skills needed for the project.

Project team diversity. Asgary and Thamhain (2016), studied the dynamics and interaction of a culturally diverse project team to further understand the influences of management leadership on the performance of these teams. The findings of this study gave valuable insight into how business processes, organizational conditions, and leadership styles affect culture and team performances. Asgary and Thamhain (2016) developed a framework for assessing leadership effectiveness and made recommendations for building high-performing , culturally diverse project teams. The research supported the notion that building diverse project teams lead to improved project success.

Virtual project teams. Internationally conducted projects require the use of a virtual project team. It is essential for virtual teams to have specific traits and skills conducive to a virtual team (Dumitrascu & Dumitrascu, 2016). In a virtual setting, team members tend to underestimate one another. However, a good project leader can help the team overcome this obstacle by facilitating shared leadership (Hoegl & Muethel, 2016).

Building trust in virtual project teams is imperative. Geographic differences, cultural differences, and lack of personal contact tend to lower trust among virtual team members (Benetyte & Jatuliaviciene, 2013). Research conducted by Breuer, Huffmeier, and Hertel (2016), showed a positive overall relationship between virtual team trust and team effectiveness. Creasy and Carnes (2017) suggest that team effectiveness is related to whether a project is successful. Therefore, virtual teams should actively seek to establish trust to increase effectiveness and the likelihood of project success.

Project team size. Large project teams usually mean the loss of productivity because of the amount of effort required for collaboration; this premise is especially true for software development teams (Bhowmik et al., 2016; Walter & Zimmermann, 2016). Staffing project teams with the right individuals is imperative which involves having the right number of people on the team for that particular project (Cattani, Ferriani, Mariani, & Mengoli, 2013). Often, in IT projects, team members have never worked together before the project; this adds a layer of complication to forming the project team.

According to Georgiadis (2015), the optimal team size decreases as the project duration decreases so if the project is to have a short timeframe, then a smaller team would be more productive. Georgiadis (2015) also found that while larger project teams tend to work harder and produce more, the likelihood of free-riding by team members increases.

Bhomik et al. (2016), found: "the agile practices best suit collocated teams of about 50 people or fewer, and the team software process is designed for use with teams of 2 to 20 members." The optimal size of the project team varies depending on the stage of the IT project. Different approaches have been used to forecast the optimal number of team members for IT

projects. Even though team size affected these IT projects, in some cases the effect was not always statistically significant (Smith, Hale, & Parrish, 2001).

Project team area of expertise. The abilities possessed by those involved in IT projects is strongly related to productivity and final product quality (Barreto, Barros, M, & Werner, 2008). In IT projects, it is necessary that project managers have expertise in technical issues (Hughes, 2013). Having years of experience is not enough because IT project teams tend to underestimate how long each technical task will take. According to Nguyen (2013), study results showed that technical expertise was a significant factor in a successful project outcome.

Risk management. Risk management in a project impacts project success (Teller, 2013). The relationship between risk, decision-making and project success are intertwined. The extent to which decisions and risk are recognized and mitigated will ultimately impact the outcome of a project. A risk is a variable that is present in all projects, and organizations must prepare for these variables strategically to be able to manage them effectively (Gindu, Chiran, Drobota, & Jitareanu, 2015).

Making decisions based on these risks must be done strategically. Consideration needs to be given to how the project aligns with the overall strategy of the organization and how the project will strengthen employees as well as enhance the company's bottom line (Van Duzer, 2010). The outcome of a project will largely depend on how well these factors are recognized and addressed.

Being able to predict the probability of risk associated with a project supports good decision-making. Ide and Dhurandhar (2017), developed a predictor model for decision making that helps decision makers fully interpret and gain a three-dimensional view of data sets.

Transferring knowledge from questionnaires to quantifiable probabilities can be useful in predicting the outcomes of projects.

Another model for assessing risks consists of:

1) Identify causes and the probability an event will occur
2) Define the probability of various outcomes
3) Identify the hazard (outcome) potential for each occurrence
4) Determine long-term consequences
5) Estimate the monetary costs of long-term consequences (Rowe, 1977).

This type of cause and effect process is prevalent when making risky decisions. Once these items are determined and a numerical value placed, then a project manager can identify preferences and possible alternatives based on these outcomes.

Another property of risk indicates a level of hazard. In most organizations, this would pertain to safety, technical difficulties, or financial problems. The outcomes of risks associated with these areas are the real hazard; therefore, the risk is the event, and the hazard is the outcome of the event (Dawson, Johnson, & Luke, 2012). The key in this association is reducing the level of hazard to an acceptable level. However, an organization must accomplish a strategic balance between knowing its willingness to accept the risk and completing the project.

Risks Involved in Information Technology Project Management

Project complexity. IT projects are risky because they are usually complicated and complexity tends to frighten individuals. IT projects involve a system of systems where each system influences the other; this makes an IT project inherently complex (Varanini & Ginervi, 2012). IT projects, many times, involve integration with existing systems; this scenario

produces dynamic complexity. Brady and Davies (2014) defined dynamic complexity as the "function of changing relationships between system components." When an IT project has a high level of dynamic complexity, it might produce outcomes that are unpredictable and produce problems without a known solution.

The Treasury Board of Canada Secretariat (2013) published a method for assessing project risk and complexity. It includes the following categories:

1. Project characteristics (18 questions)
2. Strategic management risks (six questions)
3. Procurement risks (nine questions)
4. Human resource risks (five questions)
5. Business risks (five questions)
6. Project management integration risks (six questions); and
7. Project requirement risks (15 questions)

This model was designed to help project managers mitigate risks and complexity in a project.

Research conducted by Rolstadas and Schiefloe (2017), derived four complexity drivers in projects: ambiguity, uncertainty, unpredictability, and pace. These drivers of complexity produced the following complexity factors: 1) Project context – including the primary environment, secondary environment, and tertiary environment; 2) Producing system – including project organization and production technology; and 3) System produced – including assembly project, system project, and array project. These factors impacted project execution and ultimately project results (Rolstadas & Schiefloe, 2017).

Research continues in the area of project complexity because it continually contributes to project failure in the areas of going over the budget or past the scheduled due date (Qazi,

Quigley, Dickson, & Kirytopoulos, 2016). There is an interdependency between project complexity and risk management that must continue to be addressed to reduce the likelihood of IT project failure.

Failure to apply lessons learned. A survey conducted in 2007 by CompTIA revealed that a significant cause of IT project failure was poor time estimation. Many times, an underestimation of project time and cost reflect poor project planning and poor risk management (Jorgensen & Gruschke, 2009).

Reviewing lessons learned after project completion often help improve processes, this practice has been part of project management for a long time (Birk, Dingsoyr, & Stalhane, 2002; Cannon & Edmundson, 2005; Collier, DeMarco, & Feary, 1996). Lessons learned are based on knowledge management of past projects. A study conducted by Heaton, Skok, and Kovela (2016), indicate that individuals involved in IT projects do not usually conduct lessons learned from projects; this is an ineffective use of knowledge management. If knowledge is managed well in an organization, it becomes an asset; this asset can prevent future losses in similar type projects (Winter & Chaves, 2017).

The Need for IT in Higher Education

The increasing need for information and changes in the lifestyles of individuals have radically changed educational institutions (Yalcin Tepe & Adiguzel, 2017). People need more flexibility in opportunities to attend universities and information drives what universities emphasize to prepare its students. Research shows that university culture and constraints within university systems, hinder technological innovations that could be useful for both instructors and students (Marshall, 2010). The need for flexibility and change versus an institution's traditions

that hinder change are counterproductive. Trying to adapt and move toward what students need is what drives universities to undertake IT projects.

Implementation of IT in higher education also means there is a need for quality management. Al-Shafei, Bin Abdulrahman, Al-Qumaizi, and El-Mardi (2015) suggest the following for better quality in higher education:

1. Transformation of the learners
2. Student engagement, academics, and administrative staff (leaders) in the teaching and learning.
3. Interactive teaching and learning
4. Academic professionalism that emphasizes openness, dialogue, and transparency and that improves the staff and student interface
5. Ensuring the responsive and service-oriented nature of the universities and higher education institutes
6. Building new relationships and partnerships both internally and externally with the community, industry, government, and other institutions. (p. S3)

Each of these quality initiatives for higher education requires an IT component.

Information and communication technologies in higher education. According to students, the most frequently used form of technology is a laptop or desktop, a smartphone, a tablet, and a dedicated electronic reader, along with software and applications installed on these items (Henderson, Selwyn, Finger, & Aston, 2015). From the university's perspective, the most frequently used forms of technology are learning management system (LMS), online

libraries, e-books, software specific for student learning, and simulations or educational games (Henderson, Selwyn, Finger, & Aston, 2015).

Technology Tools in Higher Education. Learning management systems are central to the learning process in most universities (van der Sluijs & Ho¨ver, 2009). Learning management systems facilitate online classes or supplement face-to-face and blended classes. An LMS is an excellent tool for not only delivering coursework, but also for organizing students and groups, grades, facilitating discussion groups, and delivering online assessments (Croitoru & Dinu, 2016).

Another IT tool that is commonly used to interact with students is WebQuest. WebQuest is a tool that allows students to interact with internet resources, usually via a learning management system, which allows students to use information instead of search for information (WNET Education, 2018). WebQuest is a classroom-based lesson, given through the learning management system, and all the information for that lesson comes from the internet. WebQuest design includes group work and individual work that incorporates video-conferencing when needed.

Simulation is another tool frequently used in higher education. A simulation involves three elements: the people, an environment, and activities (Hertel & Mills, 2002). Reality is the basis for the environment of the simulation, and the activities should provide decision-making opportunities for the students. A valuable component of simulations that aid the learning process is that it provides a way for students to practice decision-making and see the real outcomes of those decisions (Lamb, Annetta, Firestone, & Etopio, 2018).

Social media technology is another tool that is valuable to students in higher education. Several researchers argued that using the internet and social media helps build camaraderie among students who might be geographically dispersed (Jang, 2014; Barbour & Plough, 2009). Social media can be especially useful when instructing millennials in an online environment; millennials are people born between 1980-1996 (Miller, 2017).

As the use of technology continues to expand in higher education, successfully implementing these tools and the platforms that integrate these tools becomes paramount. Universities must establish a process to integrate various forms of IT reliably and efficiently; this saves the university time and money and positively impacts the students and faculty.

From pedagogy to andragogy. Online education has dramatically changed the face of higher education. Various forms of IT have facilitated this change. In the arena of online learning, there is a disconnect between the instructor and the student; it is essential that instructors craft a way to connect with students. Online programs usually have a higher attrition rate than traditional programs and are more well-suited for students who learn independently (Serdyukov, 2015). Because of this, higher education has moved from a teacher-centered environment to a learner-centered environment.

IT has become an essential part of this change. The internet, mobile computing, and social networks boost the ability of a university to move toward a learner-centered environment (David & Abreu, 2014). Creating a learner-centered environment is what a capable learning management system does. The learning management system should have a variety of content tools for asynchronous and synchronous collaboration, and various student management tools (Clark, Cossarin, Doxsee, & Schwartz, 2004).

Summary of Literature Review

Project management has been used since the early 1900s and has proliferated since the 1950s. It is important that project managers initiate, plan, execute, monitor, and control to successfully execute the various facets of project management. Project budget, schedule, scope, and quality are of the utmost importance when executing a project; these are everyday items that affect project success or failure. Project management processes include areas such as communication with stakeholders and meeting stakeholder needs and expectations; the project manager must pay close attention to these areas, or the project stakeholders become frustrated with the project.

Project management certification is another area of interest for project managers, becoming a certified project manager, either a PMP or CAPM, gives employers confidence in the project manager's ability to do the job, and it gives the project manager something that sets him or her apart in the labor market. Also, being a certified project manager presents additional income potential for the individual, as much as 20% per year.

IT project management presents specific difficulties in the project management area. IT projects are different from standard projects and must be treated as such to be successful. Changes in organizational operations significantly affect IT project management; this occurs in both the public and the private sector. Public sector and private sector IT projects face different challenges as well.

Research provides different reasons for IT project failure including items such as project scheduling, scope creep, lack of project definition, project complexity, and lack of end-user

involvement in IT project development. Although there are other reasons for IT project failure, these were common in the literature.

Project managers receive helpful insight when conditions that impact project success are understood. Project success can be evaluated from various perspectives and also by various stakeholders associated with the project. There were nine commonly found success factors for standard projects including communication, time, agreeing on the mission, quality, using the finished product, budget, project manager competencies, project delivering strategic benefits, and top management support. For IT projects, there were also commonly found themes about success factors that contribute to IT project success. They were, having a subject matter expert, communication, organizational culture, project manager leadership style, top management support, the project team, and risk management. Finally, risk management in IT projects included literature about project complexity and using lessons learned to increase the likelihood of IT project success.

The final portion of the literature review presents findings regarding changes in higher education over the last twenty years and the need for IT in higher education. IT in higher education is necessary to engage learners and has moved higher education from pedagogy to andragogy in learning style. Information and communication technology in higher education, along with various technology tools, create a new and exciting environment for learning when appropriately used.

All concepts mentioned in the literature review provide past and current knowledge regarding project management processes, project success, IT projects and the various challenges associated with them, factors that contribute to IT project success, and what project management certification means and the benefits it provides. Also, the literature provides sources and

information about IT in higher education and why it is imperative that institutions of higher education have IT and use it to its fullest capability.

The next section of this study will explain the role of the researcher, the participants, the research method and design, how the population was chosen, instruments used to collect data, data analysis, reliability, and validity of the research methods and design.

Section 2: The Project

The results of this study sought to find common causes of IT project failure in public universities. The information was gathered using a case study research design. Section Two of the research study includes the purpose of the research, the role of the researcher, description of the participants, description of the research method and design, description of the population and sampling, description of the data collection for this study, the instruments used to collect the data, and description of the data collection techniques. After a discussion of the foundation of the research and data collection, data analysis is discussed. Data analysis included the coding process used to develop themes and a discussion of reliability and validity for the qualitative elements of this research.

Purpose Statement

The purpose of this qualitative study collected common causes for IT project failure in two-year and four-year public universities in Oklahoma and determined what role facilitated the IT project; this study used interviews to collect the data. IT projects are those that required software changes, hardware changes or integrate new technology (Taylor, 2003). Common causes of IT project failure and what role facilitated the IT project were drawn from the interviews and presented as the primary factors affecting IT project failure in the universities studied.

This study considered three scenarios when looking at IT projects: those that used certified project managers, those that used non-certified project managers, and those that used a non-project manager to facilitate the project. For this study, a certified project manager was one who has obtained certification from the Project Management Institute (PMI). A non-certified

project manager was one who worked as a project manager without PMI certification. A non-project manager was a facilitator who did not work in the project management profession. For instance, a Director of Information Technology employed by a university was considered a non-project manager. There was no consideration of the project lead's actual job description when defining the role of certified project manager, non-certified project manager, and non-project manager.

The outcomes of this study provide universities with useful information in decisions about what role implements future IT projects and how to plan for those future projects. Once universities have this data available, universities might consider additional areas of risk management, who should be involved in project planning, and re-evaluate how projects are planned to aid in the prevention of future IT project failure and to maximize the use of resources.

Role of the Researcher

The role of the researcher in this study was the primary researcher. The primary researcher was responsible for determining participants, collecting the data, analyzing the data, and presenting the outcomes of the study. It was crucial for the researcher to uphold ethical practices while conducting research (McDermid, Peters, Jackson, & Daly, 2014). This study included interviewing human subjects, therefore an evaluation of three principles from the Belmont Report about ethical research was conducted. These principles were 1) respect for persons, 2) beneficence, and 3) justice.

First, Drake and Yu (2016), said that the autonomy of participants is critical for respect of persons in research. Second, to uphold the principle of beneficence, researchers must do no harm, minimize potential harm from the study, and maximize potential benefits from the study

(Drake & Yu, 2016). Lastly, to uphold the principle of justice, participants should be treated equally (Drake & Yu, 2016). To fulfill the responsibilities of respect, beneficence, and justice are; the researcher used the following strategies, 1) disclose employment history, 2) disclose philosophical worldview, 3) treat participants as equals, 4) use informed consent, 5) develop a protocol for interviews, and 6) construct follow-up interviews carefully.

A researcher was the primary collector of data (Chan, Fund, & Chien, 2013); therefore, identifying potential biases was vital for the participants and the validity of the study. Biases can affect the understanding of data collection and data analysis. This researcher mitigated research bias by understanding the primary researcher's philosophical worldview, understanding how this affected the primary researcher's values and ideologies, and understanding how this philosophical worldview might impact this study and the method used for this study.

Employment History

Revealing the relevant employment history of the researcher was essential to upholding respect, beneficence, and justice for the participants in this study. The researcher is currently an instructor at Rogers State University (RSU) which is a public university in Oklahoma. Two years ago, RSU underwent an IT project that consisted of changing from one learning management system (LMS) to another. As an end-user and participant in the IT project, there is a potential bias related to the outcome of the LMS project. RSU was one of the universities interviewed for this study; therefore, the primary researcher must set aside any personal view of the project outcome to ensure data collection and analysis was fairly presented.

Philosophical Worldview

The philosophical worldview of the researcher was the second component that was important to uphold respect, beneficence, and justice for the participants in this study. The philosophical worldview that most closely aligns with the primary researcher's perspective is the positivist/post-positivist worldview. Positivists/post-positivists view research through reality by trying to remove all biases; in doing so, they present objective research. Positivists take research at face value and believe the conclusions never change. However, post-positivists are not afraid to do further research which might change the outcomes of prior research. In both instances, both worldviews seek to be objective to obtain the best research and conclusions.

Along with this same line of thinking, the primary researcher believes there is a single reality; whether the fullness of that reality is known or not. Meaning, given the data today, data analysis will lead to a logical conclusion. However, all the data related to that subject might not be available. Therefore, in ten years, an outcome might change because of more data collection. Philosophical ideas and colloquial phrases do not mean much; what matters is the outcome of those ideas and phrases. A logical order for doing any activity is essential to the primary researcher; therefore, this study was approached in this manner.

Treat Participants as Equals

Treating participants as equally important was the third component that was necessary for upholding respect, beneficence, and justice for the participants in this study. The Belmont Report (2018) identified three populations as vulnerable participants in research. These populations include children, prisoners, and people with certain medical conditions. The participants selected for this study were not part of any vulnerable population. This study dealt

with project outcomes in public universities and project leaders; therefore, participant selection depended on the type of university, the location of the university, and the role of the project leader. These selection criteria were used for all participants and were therefore treated equally.

Informed Consent

Gaining informed consent from participants was the fourth component that was important in upholding respect, beneficence, and justice for the participants in this study. According to Grady (2015) and the Department of Health and Human Services (2018), all researchers should use informed consent. Informed consent for this study provided the participants with the purpose, risk, and benefit regarding the study. Participants receiving informed consent insured that the researcher 1) provided the participant with adequate time for the participant to consider all options, 2) answered any questions the participant had, 3) ensured the participants understood all information presented in the informed consent, and 4) gained the participants voluntary participation agreement. Finally, informed consent provided participants with expected outcomes from the study and allowed participants to withdraw from the study at any time. These actions gave the participants autonomy.

Interview Protocols

Using interview protocols was the fifth component that was important in upholding respect, beneficence, and justice for the participants in this study. Using interview protocols standardized the format and content of the interview instrument (Peters & Halcomb, 2015). Formatting provided a consistent approach which meant each interview had little to no variation. These measures reduced possible researcher bias in the way in which questions were asked (Benia, Hauck-Filho, Dillenburg, & Stein, 2015).

Follow-up Interviews

Carefully constructed follow-up interviews were the final component that was important in upholding respect, beneficence, and justice for the participants in this study. For this research, it was possible that follow-up interviews were needed either via phone or in person. Yin (2014), recommends phrasing interview questions using *what* or *how* questions and avoiding *why* questions. Using this strategy for this research study helped participants stay on topic and avoid emotional reactions (Yin, 2014).

Participants

This researcher gained access to those involved in past university IT projects through permission of the Director of Information Technology or an equivalent of the Director of Information Technology who had prior knowledge of university IT project implementations. First, the researcher contacted participants through an email that outlined the intention of the research project. The researcher made regular contact with participants throughout data collection to ensure understanding of all questions. For this study, there was a possibility of 27 two-year and four-year public universities combined in Oklahoma; 15 four-year universities and 12 two-year universities.

Names of respondents were not collected in the dataset to protect the privacy of participants; participants were coded according to the type of university which was represented; a two-year or four-year university. A code key was developed and kept separate in a password protected file only accessible by the researcher. Although the risk to participants was minimal in this study, the researcher showed diligence in keeping participant information completely confidential.

Research Method and Design

This study used a qualitative case study design. Case study research is appropriate to use when studying a specific event or series of events (Stake, 2010; Yin, 2014). There are three different types of case study research, instrumental case study, collective case study, and intrinsic case study (Cresswell & Poth, 2018). Instrumental and collective case study research focuses on a single issue. This type of research uses either a single case or multiple cases to demonstrate the issue (Yin, 2014). An intrinsic case studies the occurrence of a unique situation (Stake, 2010).

Case studies are bound by a specific time, activity, or process from one or more individuals, and then the researcher develops an in-depth analysis of the topic. A case study design fits the parameters of this research because the researcher used multiple cases to demonstrate the issue of failed IT projects and the difficulties this presents in public universities. According to Wilson, Onwuegbuzie, and Manning (2016), a case study researcher collects data by interviewing, observing, collecting documents, viewing pictures, or a combination of these. For this study, an interview with open-ended questions collected the data.

Case study research was the best method for this research because it is valid and reliable for collecting data and presenting the findings of this research. Also, case study research was appropriate for this study because the common causes of IT project failure in public universities was collected using open-ended interview questions. Collecting common causes of IT project failure and discovering what role led the IT project was the purpose of this study. The participants needed latitude to explain the common causes of IT project failure; this was accomplished through the open-ended interview questions.

Population

The purpose of this study was to collect common causes of IT project failure in two-year and four-year public universities in Oklahoma. The results of this study aim to help public universities more successfully implement future IT projects. This section describes the population chosen and the sampling method used.

The population for this study was 12 two-year and 15 four-year public universities in Oklahoma. This population was chosen due to the geographical access to these universities and because the population offers the opportunity to gain a significant sample size. It was essential to choose a population to which the primary researcher had easy access, but that would also produce enough data to fulfill the purpose of this study. The sample drawn from this population was based on convenience sampling.

Sample

Convenience sampling is used when choosing participants based on the availability of the primary researcher (Lee-Jen Wu, Hui-Man, & Hao-Hsien, 2014). Convenience sampling is a non-random type of sample where the participant is chosen due to the researcher having easy access (Sedgwick, 2013). Using this sampling method was proper for this research because the primary researcher was in Oklahoma. This study interviewed participants to collect the necessary data. The participants were asked to answer a series of questions about an IT project on which he or she had the knowledge and to answer all questions regarding the same IT project throughout the interview process.

Because of the qualitative nature of this study, data saturation was also considered in conjunction with convenience sampling. Failure to reach data saturation negatively affects the

quality of the research (Fusch & Ness, 2015). Data saturation is considered reached when there is no new data, there are no new themes, no new coding, and the study can be replicated (Guest, Bunce, & Johnson, 2006). Data saturation is discussed further in the next section.

For this study, the researcher contacted a total of 27 possible participants at 12 two-year and 15 four-year public universities in Oklahoma. The number of participants who agreed to an interview was nine.

Data Collection

Instruments and Technique

Appropriate data collection is the foundation of quality research (Vogt, 2010). The research in this study was conducted through qualitative research design; therefore, the presentation of qualitative elements of data collection was necessary (Creswell & Creswell, 2018). For this study *yes or no* interview questions with open-ended follow-up questions collected the data. A description of this area is in the following section.

Qualitative. There are many research approaches to studying project management, and there are just as many instruments available for measuring project failure (Badiru, Rusnock, & Valencia, 2016; Handzic & Bass, 2017). For this study, conducting interviews was the best method of data collection. Some of the questions in the interview were derived from a survey tool created by Dr. Seth Gillespie in 2014 but were revised to fit this study. The primary researcher created the remaining interview questions. The entire interview dialogue and questions are available in Appendix A. Qualitative data collection for this study is further described in the following paragraphs.

Permission to participate in this survey was obtained from the Director of Information Technology or an equivalent of the Director of Information Technology who had prior knowledge of the university's IT project implementations. Once permission was received, participants were contacted via email with a description of the study and to establish an interview time. The raw data produced from these interviews included the role of the project leader and why the project failed based on the triple constraint.

The personal experience of the primary researcher was the reason for this study. The primary researcher is currently employed at a public university in Oklahoma and recently – two years ago – experienced a learning management system changeover. The IT project was not a success according to the parameters of this study. Although, it was completed on time and within budget, it did not deliver the functionalities promised and still does not at the time of this study. To ensure that the primary researcher's experience was not reflected in this study the data was coded to identify themes; only the experience of the individual interviewed were presented in the findings. The themes found illustrated the common causes of IT project failure in public universities.

Having an interview process was essential to keep consistency in this study (Punch, 2003); ensuring that all participants were treated equally for the duration of the study. The interview process contained the following steps: 1) A permission request letter was sent to the Director of Information Technology, or an equivalent position, to participate in the study, 2) Once the participant agreed to be part of this study, then informed consent was obtained, 3) After receiving written informed consent, the primary researcher contacted the Director of Information Technology, or the equivalent, to set up an interview time, 4) Interviews were conducted and recorded according to schedule via telephone, and 5) Interviews were transcribed for coding

purposes. For a university to qualify for this study, it must be a public university in Oklahoma. Upon completion of data collection only the project failures were used to compile the data.

This study included open-ended interview questions to develop the common causes of IT project failure at public universities in Oklahoma. The open-ended interview questions included:

1. Why was the IT project not completed within the allotted timeframe?
2. Why was the IT project not completed within the allotted budget?
3. Why did the IT project not deliver the functionality promised?

These open-ended questions were recorded, transcribed, and coded for themes. These interview questions developed the common factors that contribute to the high rate of IT project failure in public universities, which is the first research question in this study.

Research question 2 (RQ2) asks, *What role facilitated the failed IT project in public universities in Oklahoma?* The data for this question was collected through a question asking the participant if the person who led the IT project was a PMI-Certified Project Manager, a non-PMI Certified Project Manager, or a non-Project Manager. The participant chose one of these three and that data was compiled separately.

Data Organization

The nature of this study required data collection through open-ended qualitative questions. The qualitative data were transcribed, coded, and organized so themes could be organized. All qualitative data were stored on a password-protected computer, in a password protected file using Microsoft Excel.

Data Analysis

For this case study, completed interviews were divided into two groups, two-year public universities, and four-year public universities. Then, interviews were transcribed and coded with themes derived from those interviews. Data were presented in tables followed by a detailed description of the interviews.

Qualitative Data Analysis

Qualitative data analysis addressed collecting the common causes of IT project failure in public universities and what role facilitated the IT project. The facilitator of each IT project was an essential piece of this research. For this study, a certified project manager was a Project Management Professional certified through the Project Management Institute (PMI). The PMP is the most highly recognized project management credential (Bredillet, 2010). The PMP has obtained the knowledge and skills necessary to pass a rigorous exam and has at least 4,500 hours of project management experience (Project Management Institute, 2017). A non-certified project manager was a person who works as a project manager, is not PMP certified, but functions in the role of a project manager. A non-project manager was a person who did not work in a project management role.

Another component of this data analysis was the general cause of the failed IT project. For this study, IT projects from these universities failed when any one of the following conditions were met; 1) the project was not completed within the allotted time, 2) the project was not completed within the allotted budget, and 3) the IT project did not meet all functional requirements of the university (Bronte-Stewart, 2015; Chandler & Thomas, 2015).

The data collected with interviews were analyzed using the following process; 1) information was coded, 2) themes were generated, 3) most common fail measures were established, and 4) what role facilitated the IT project was determined. The following paragraphs describe this process in more detail.

First, data collected from interviews were coded. Coding is organizing the data by bracketing it into chunks and then writing a word or phrase that represents the overall meaning (Rossman & Rallis, 2012). The data from the open-ended questions were segmented into sentences and categories; then those categories were labeled using a term based on the language of the participant. After the labels were created for each category, then a description of the themes was generated. The themes that were generated were the significant findings from the open-ended interview questions. From these themes, the common causes of IT project failure were determined.

Validity and Reliability

The validity and reliability of a study are important because these components reflect the value of the outcomes of the study (Campbell & Stanley, 2015). If a study is both valid and reliable, then the outcomes of the research are valuable (Abowitz & Toole, 2010). This study employs a qualitative design; therefore, validity and reliability must be established for case study research.

Qualitative Validity and Reliability

In qualitative research, it is necessary to establish credibility. Credibility addresses how the researcher can be confident that the information in the study is adequately represented by the results (Lincoln & Guda, 1985). Transferability in qualitative research is like external validity in

quantitative research; it addresses to what extent the results can be transferred to others meeting the criteria of the initial research sample (Lincoln & Guda, 1985). Dependability in qualitative research is like reliability in quantitative research; it refers to how stable the data is over time and across conditions (Lincoln & Guda, 1985).

There are tools that a researcher can use to increase credibility, transferability, and dependability. First, the researcher can perform triangulation, which looks at multiple sources of data to confirm or answer the research questions to ensure accuracy (Cresswell & Poth, 2018). Second, the researcher can perform disconfirmation which discloses the exceptions to established themes in the research (Cresswell & Poth, 2018). Third, the researcher can perform reflexivity, which compares recent data collected to historical data collected (Cresswell & Poth, 2018). Finally, the researcher can try to achieve data saturation. Data saturation is reached when there is enough information to replicate the study, when the ability to obtain new, additional information is reached, or when further coding is not possible (Fusch & Ness, 2015).

For this study, triangulation was used to establish credibility, transferability, and dependability for *RQ1*. *RQ1* asked *What are the common factors that contribute to the high rate of information technology project failure in public universities in Oklahoma?* This study obtained information from nine Directors of Information Technology, or an equivalent, who had in-depth knowledge of IT projects performed at the public university meaning information was gained from multiple data sources. According to Denzin (2012), gaining information from multiple data sources results in triangulation. There is an essential link between triangulation and data saturation; data triangulation ensures that data saturation has occurred (Fusch & Ness, 2015).

Data saturation is another part of credibility, transferability, and dependability in qualitative research and was used in this study. According to Fusch and Ness (2015), interviews are one method used to reach data saturation. Data saturation occurs in interviews because the information is both high quality and high quantity (Dibley, 2011). Achieving data saturation through interviews happens if the interview uses the same questions for each participant (Guest, Bunce, & Johnson, 2006). This study used the same questions for each participant to reach data saturation.

Transition and Summary

This study used a qualitative research approach, case study design, with interviews as the research instrument. The researcher sought to determine common factors that contributed to the high rate of IT project failure in public universities in Oklahoma and also what role facilitated the failed IT project. Implementing good project management principles does not mean that a one-size fits all approaches has a successful outcome, especially in the dynamic environment of IT projects.

Section 2 provided definition to the purpose of the study, the researcher's role, and who participated in the study. This section provided a road map for implementing the study and answering the research questions by addressing the methodology, specific research design, sampling, data collection, and data analysis. Finally, this section described reliability and validity of qualitative research and how this study achieved those measures. Section 3 will present the findings of this research, implemented as discussed in Section 2, with a thorough discussion of interview questions and answers along with development of themes from the interviews.

Section 3: Application to Professional Practice and Implications for Change

Overview of the Study

Determining the common causes of IT project failure addresses differences in how IT projects are currently implemented versus a more efficient way to implement IT projects based on changes in project management practices for IT projects. The failure rate of IT projects is exceptionally high when compared to other types of projects (Keil & Mahring, 2010). Also, IT projects involve complexity that other projects do not have (Daniels & LaMarsh, 2007). Therefore, the results of this study might help reduce IT project failure.

This study reviewed the interviews of Directors of Information Technology, an Information Technology Department Manager, and a Chief Information Officer at two-year and four-year public universities in Oklahoma. This study collected data that examined the relationship between common causes of IT project failure and what role facilitated the IT project. During the phone interview process, a script was used to administer the eight interview questions. All participants indicated an understanding of the script and the interview questions. The findings of this research indicated the general causes of IT project failure was not completing the project within the allotted timeframe and the IT project not delivering all the operational components intended.

Anticipated Themes

IT project management presents specific challenges in the project management area. Based on a review of the literature, the results of this research might include items such as problems with project scheduling, scope creep, lack of project definition, project complexity, and lack of end-user involvement. All of these aspects of failure for IT projects involve both people

and technology. Sociotechnical theory describes the relationship between people and technology and how both components must be used to optimize performance (Trist, Higgin, Murray, & Pollock, 1963; Kessler, 2013). Finding the common causes of IT project failure and what role facilitated the IT project allows project managers an opportunity to create a better balance between the technical side of project management and the people side of project management.

Presentation of Findings

In this section, there is a thorough discussion of the interview questions, responses, the themes that emerged from the interviews, and conclusions regarding the themes. For this study, there was a total of nine participants interviewed, six participants from four-year public universities in Oklahoma and three participants from two-year public universities in Oklahoma. The purpose of this study was to determine the common factors that contribute to IT project failure in public universities in Oklahoma. The interview questions were based on the triple constraint of time, budget, and project deliverables.

After interviews were conducted, this study found that in five occurrences the IT project was not completed within the allotted timeframe and in four occurrences the IT project did not deliver all operational components. All IT projects were completed within the allotted budget. Follow-up questions sought to determine why the IT project was not completed within the allotted timeframe or why the IT project did not deliver all operational component. Based on the responses of the participants, three themes emerged: complexity, poor communication which led to problems with project scheduling, and project interference which led to problems with scope creep. With nine participants expressing similar difficulty in completing IT projects, it was apparent that data saturation occurred.

Data Saturation and Triangulation

It was necessary for the researcher to collect valid and reliable data; this was accomplished through data triangulation and data saturation. In qualitative research, data triangulation refers to the use of multiple data sources to develop a thorough understanding of the topic (Patton, 1999). Data source triangulation involves collecting data from multiple data sources; this includes collecting information from multiple people (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014) Data source triangulation was accomplished by comparing what the participants from this research experienced with current literature regarding the topic of IT project failure.

Triangulating for validity occurs when data collected in current research corresponds with previous literature (Seidman, 2013). Again, the participants in this research encountered problems during IT projects, and there is current literature about common factors that contribute to IT project failure. Based on the definition of data triangulation, the fact that four independent causes of IT project failure found in this research corresponded with previous literature lend to the validity of this project (Seidman, 2013).

According to Glaser and Strauss (1967), data saturation is "The criterion for judging when to stop sampling the different groups pertinent to a category is the category's *theoretical saturation*. *Saturation* means that no additional data are being found whereby the sociologist can develop properties of the category" (p.61). Based on this definition of data saturation, when common themes have emerged in participant interviews, but no additional themes emerge, then data saturation has occurred. Based on the definition of data saturation, this study reached data saturation with nine participants from nine universities in Oklahoma.

Data Collection Process

Upon successful contact with the participants, the primary researcher read a script to ensure the participants understood the type of project to which the discussion should relate. The participant was instructed to think about an IT project over which he/she had significant knowledge, to answer all questions regarding the same IT project, and to choose a project that was considered a failure based on time, budget, and/or deliverables. Also, the participant was informed that for the purposes of this project, IT projects were ones that required software changes, hardware changes, or new technology integration.

The interviews conducted allowed the collection of qualitative data pertaining to the triple constraint of the IT project: time, budget, and deliverables. In project management, the triple constraint is a common baseline for determining success or failure of a project (Catanio, Armstrong, & Turcker, 2013). The constraint that caused the IT project to fail was further explored with an open-ended question and explanation from the technology leader who participated in the study.

Research Question One

The next few paragraphs discuss the themes that emerged from the participant's interviews that answer *Research Question 1(RQ1): What are the common factors that contribute to the high rate of information technology project failure in public universities in Oklahoma.*

Emergent Theme 1: Complexity. IT projects are well-known for being complex which is a commonly cited source of IT project failure (Daniels & LaMarsh, 2007). The following paragraphs explore Participant 2, 4, 6, and 9's experiences and discuss how complexity emerged as the theme.

Participant 2 indicated there was an operational component that the university had particular trouble with while integrating new software with the current system. Participant 2 stated, "The component that gave us trouble performed fine in the test environment, but it did not work in the operational environment" (Participant 2, personal communication, September 13, 2018). Further exploration of this problem led to the realization that the dynamics in the test environment were not as complex as the dynamics in the operational environment. Participant 2 stated:

> It was kind of a miscalculation on our part in the testing and the dynamics of the operational environment, so in the area of instruction to be specific. You don't have a cookie cutter way that the classroom engages or the instructor engages, or how many instructors might be engaging in that particular class. And so that added a dynamic and a dimension that we did not correctly anticipate. (Participant 2, personal communication, September 13, 2018)

The participant further indicated that they were now aware of the software configuration needed to account for a more dynamic environment and would certainly use this so that IT projects would not fail for this reason in the future.

Participant 4 also indicated that the reason for IT project failure was that the IT project did not deliver all operational components intended, but the root issue was the complexity of implementation. As stated during the interview:

> The way I would describe it is when we were contemplating the project, and we did some testing, everything tested fine, but over the duration of time, we discovered that there were some issues that were not discovered during testing because they did not come up during the testing process only during its implementation. (Participant 4, personal communication, September 20, 2018)

Participant 4 continued to explain that it took two or three weeks for them to figure out all the issues. There were things happening on the user side that were not apparent on the technical side; it created a lot of frustration and confusion (Participant 4, personal communication,

September 20, 2018). It was strikingly similar to what Participant 2 indicated with their IT project. Participant 4 did not divulge whether a solution to their problem was something that could be used in the future.

Participant 6 also stated that the reason for their failed IT project was because the IT project did not deliver all the operational components necessary (Participant 6, personal communication October 5, 2018). It was during the discussion with this participant that an apparent theme emerged; trouble in the operational environment that did not present in the test environment because of the complexity of integrating the new system. Participant 6 stated there were two components that caused problems during system integration and it was something that did not happen when the system was being tested; it only occurred when the IT project went live. Participant 6 stated:

> One component that has given us problems did not give us trouble in the test environment. However, in the live environment, there were actually a couple of components that did not work correctly. These had to be reconfigured, which was no small task. It is working properly now, but when the project was implemented it was a big issue. (Participant 6, personal communication October 5, 2018)

Participant 6 further indicated that many components had to be evaluated one by one to determine the problem. As a secondary part of this particular project, Participant 6 was not able to correct the problem in time, so the IT project also was not completed within the allotted timeframe. In this case, the participant indicated that if the IT project had delivered all operational components, then it would have been completed within the allotted timeframe (Participant 6, personal communication October 5, 2018).

Participant 9 also stated that IT project failure occurred because the IT project did not deliver all the operational components needed at completion. Initially, Participant 9 indicated

that the software changes were too complex for the level of training personnel had who were involved in the IT project; there were several people involved, including a non-project manager who was leading the project. The university was undertaking a complete LMS change, and the new system was supposed to be an all-in-one system. This meant that students enrolled, employees looked at pay stubs, classes were taught, etc. all through one system (Participant 9, personal communication, January 8, 2019).

According to Participant 9, when the LMS conversion began, everything would be operational in the fall of 2017, with the exception of the enrollment system which would be completed in the fall of 2018. The old LMS system was used for the classes that were taught in the summer of 2017, but as these classes were being taught, they also had to be converted over to the new LMS (Participant 9, personal communication, January 8, 2019). Participant 9 indicated there were communication problems with faculty, lack of clear direction about the responsibilities of faculty and project members, and several other issues. Participant 9 stated, "It was just very complicated, there were so many irons in the fire, it was difficult to keep everything on track" (Participant 9, personal communication, January 8, 2019). Upon further discussion, Participant 9 revealed that although complexity played a significant role, there were several operational problems after implementation. Participant 9 stated, "It was almost as if we were dealing with a different system than what we had used to train faculty and staff. Things were not working in the live product the way they worked when we tested the product." These sentiments are the same as those of Participant 4 and 6. It seemed for Participant 9 that complexity was definitely a cause of project failure, but it was coupled closely with the operations of the LMS versus the testing of the LMS.

Participant 9 indicated that there are still components that are not operating as intended as

of January 8, 2019,

> For the most part, the classroom part of the LMS works very well. But, we are still using two methods for employees to view pay stubs and when students want to add or drop classes, it doesn't always work when it's done through the new system. These are items we continue to work through with the provider of the new LMS. We are committed to this product, so we have to make it work. (Participant 9, personal communication, January 8, 2019)

Obviously, the problems with the LMS implementation caused a ripple effect of problems throughout the university. It has been a frustrating experience for students, admissions staff, registrar staff, faculty, and the project team (Participant 9, personal communication, January 8, 2019).

Complexity and Previous Research. Complexity is the interrelationship between uncertainty and ambiguity (Gransberg, Shane, Strong, & del Puerto, Project complexity mapping in five diminsions for complex transportation projects, 2013).This definition fits many situations found in IT project management. In this study, complexity emerged in different ways.

The first way in which complexity emerged was through the difference between the operational environment of software upgrades versus the test environment of software upgrades. Participants 2, 4, and 6, stated that the primary factor that contributed to IT project failure was the technical component did not perform in the operational environment like it did in the test environment (study participants, personal communication, September 13, 2018, September 20, 2018, & October 5, 2018). Participant 8 stated this same occurrence as a secondary factor contributing to IT project failure (Personal communication, December 18, 2018). For Participant 8 there were two layers of complexity. The first layer and primary factor contributing to IT project failure was the “complexity of the new LMS system;” the project team lacked the skills needed to implement an entirely new system that encompassed all operations of the university (Participant 8, December 18, 2018). For this study, in all cases of IT project complexity, the IT

project did not deliver all the operational components at the project end date. In all instances, the university operations were directly impacted, and, in some instances, faculty, students, and other users of the system were also impacted. Complexity has become inseparable from IT projects, and researchers continue to try to understand commonalities between IT projects, so complexity can be addressed (Bakhshi, Ireland, & Gorod, 2016).

There are degrees of project complexity, which include simple, complicated, and chaotic; in IT project management the projects are always, at the lowest level, complicated (Bakhshi, Ireland, & Gorod, 2016). In complicated projects, there is a cause-and-effect relationship between certain tasks, and personnel expertise is an essential component of successfully completing this type of project (Snowden & Boone, 2007). There are two levels of a project that is classified as complicated, lower-level and upper-level. A *lower-level complicated* project might have only one or two parts of the projects where tasks are interdependent, and maybe only one expert is needed on the project team. An *upper-level complicated* project might mean that all tasks are interdependent, and each project team member requires a specialized field of expertise. *Chaotic* projects are typically those that include emergencies or natural disasters. Many organizations have disaster plans in place, but when the disaster occurs, the dynamics of the situation are so intricate that it is impossible to plan for everything (Snowden & Boone, 2007). In this study, the IT projects at these universities would fall in the complicated degree of project complexity. The IT projects that Participants 2, 4, 6, and 9 discussed had interdependent tasks and needed experts to fulfill the deliverables of the projects. The degree of project complexity for these projects would have fallen in the lower-level or upper-level range of complicated.

Complexity and Conceptual Framework. Project management has a socio-cultural aspect and a technical aspect as supported by the Sociotechnical Theory. The interaction between the social aspect of project management and the technical aspect of project management adds layers of complexity to IT project management. In accordance with joint optimization in the sociotechnical theory, it is the project manager's duty to find the optimal interaction between the social side of project management and the technical side of project management so that complexity is reduced as much as possible.

Complexity and RQ1. The theme of complexity answered *Research Question 1(RQ1): What are the common factors that contribute to the high rate of information technology project failure in public universities in Oklahoma.* The participants in this study thoroughly described how IT project complexity was the primary factor that contributed to IT project failure. In the future, additional planning for the degree of IT project complexity could mitigate this factor.

Emergent Theme 2: Breakdown in Communication and Project Scheduling. The lack of cooperation between vendors, who were supposed to be aiding in the university IT projects, and university personnel was another contributing factor regarding IT project failure. Participants 1, 3, 7, and 8 indicated that issues with the vendor were the primary factors contributing to IT project failure. After discussing the lack of vendor cooperation, it appeared that communication and project scheduling were the specific issues between the vendors and university personnel. The following paragraphs explore the experiences of Participant 1, 3, 7, and 8.

Participant 1 indicated the vendor was "unable to complete the required checklist of necessary changes in the time allowed" (Participant 1, personal communication, September 13, 2018). Upon further exploration of why the checklist was not completed, Participant 1 indicated

"the vendor would not commit to a timeline from the beginning of the project" (Participant 1, personal communication, September 13, 2018). Participant 1 indicated that he led the project as a non-project manager, but he still understood the importance of having a timeline for the project, especially in a university setting. Ultimately, Participant 1 indicated a high level of frustration because this was the vendor who managed their current system and any updates had to go through this vendor; there was not an option to change vendors. Participant 1 did not indicate any difficulty with the budget or deliverables.

Participant 3 also indicated that their IT project failed because it was not completed within the allotted timeframe. Participant 3 indicated the project was three months out and still not completed (Participant 3, personal communication, September 19, 2018). When asked about the details surrounding this project running over its allotted timeframe, Participant 3 stated:

> Our third-party vendor was critical in this IT project being successful, and they just did not cooperate with us or our timeline. There was no urgency on the part of our third-party vendor. We needed their input to successfully integrate this new component, and they would not work on our timeline. We were at their mercy and had to wait on them. (Participant 3, personal communication, September 19, 2018)

Participant 3 did indicate that, in hindsight, if the third-party vendor had been contacted first about a timeline, then this situation would not have occurred because the university and primary vendor could have worked on the third-party vendor's timeline. Participant 3 did not indicate any problems with the budget or deliverables.

Participant 7 also indicated that IT project failure occurred because it was not completed within the allotted timeframe. During the discussion, the problem became clear that a third-party involved in the project was uncooperative (Participant 7, personal communication, October 5, 2018). As stated in the discussion, "Ultimately, it was unsuccessful because the person that was

over the area that we were computerizing wouldn't cooperate, basically. In other words, I couldn't get him to get off of his butt to make it successful" (Participant 7, personal communication, October 5, 2018). Again, this response indicates a third-party caused this IT project to fail. Participant 7 did not indicate any problems with the budget or deliverables.

Participant 8 also indicated that IT project failure occurred because it was not completed within the allotted timeframe. Participant 8 said this particular IT project involved the university phone system and not finishing within the allotted timeframe caused significant communication problems for the university. Participant 8 stated that the third-party vendor, in this case, the telephone company, was supposed to be assisting the university with a software upgrade to the phone system. After a timeline was set and the software conversion was to begin, the third-party vendor seemed to have scheduling conflicts. In addition, the vendor "charged the university extra money" during each step of the software upgrade (Participant 8, personal communication, December 18, 2018). Although this did not put the conversion over budget, it did contribute to not finishing in the allotted timeframe because of the approval process for additional funds. Participant 8 stated that if there is future dealing with this third-party vendor, and if the same leadership is in place, then things will have to be done differently. Since the project took about a week longer than expected, the voicemail system and messaging system were completely inoperable (Participant 8, personal communication, December 18, 2018). Participant 8 said the university's major mistake was trusting the third-party vendor would be helpful and understood the importance of the software upgrade for the university. Participant 8 did not indicate any issues with deliverables or being over budget for this IT project.

Communication, Project Scheduling, and Previous Research. In IT projects, communication takes place at two levels, the individual level and the organizational level (de

Carvalho, 2013). Even though the PMBOK provides thorough processes for developing and managing communication for project management, it is not always sufficient for eliminating barriers to communication (Gillard, 2005). In the organizational environment, there are many reasons for barriers to communications. According to research, the most frequent barriers occur because of power, semantics, stakeholder perspective, and technical problems (Effy & Sosik, 2000; Gillard, 2005; Barclay & Osei-Bryson, 2010). The participants in this study indicated communication problems occurred because the arrangement was with vendors outside the university and those vendors did not have the same stakes in the outcomes of the IT projects that the universities did. Referring to the vendor, Participant 3 stated, "they just did not cooperate with us or our timeline" (Participant 3, personal communication, September 19, 2018). Participant 3's experience aligns with the organizational communication problem of the stakeholder perspective. When dealing with an outside vendor, extra attention needs to be given to information sharing so that trust can be built and there is a full understanding of the project from each perspective (Lo & Lieb, 2008). Using this approach could have resulted in a successfully completed IT project for some of the universities in this study.

In addition to communication difficulties, project scheduling is another area in which Participant 1, 7, and 8 encountered a problem. Specifically, these participants said they had difficulty getting the vendor to "commit to a timeline" or to "get on our project timeline" for the duration of the IT project (study participants, personal communication, September 12, 2018 – December 18, 2018). According to one study, who has control of the project should be addressed upfront in these circumstances; this type of discussion rarely takes place but can change the outcome of the project (Liu, Wang, & Huang, 2017). Each project is unique in nature; therefore, project scheduling is also unique. This sentiment is especially true for IT

projects because there is typically no historical data for hardware changes, software conversions, or system integrations in each individual technical setting (Ji & Yao, 2017). In the cases of Participants 1, 7, and 8, there was also a lack of buy-in for the vendor for these IT projects. These factors combined are significant challenges to overcome.

Participant 1 indicated the vendor would not commit to a timeline from the beginning of the project (Participant 1, personal communication, September 13, 2018). Prater, Kirytopoulos, and Ma (2017) stated that the lack of project scheduling contributes to the high failure rate of IT projects. If a vendor will not commit to a project timeline, then there is a limited ability to have a valid project schedule. A limitation of this statement is the primary researcher did not ask about the project scheduling process; this aspect could give more insight.

Further insight into project scheduling problems was given by Participant 7 and Participant 8. Participant 7 indicated there was very little cooperation on the part of the vendor until it was going to impact their department in their organization. Only then did the vendor become helpful and finish the project (Participant 7, personal communication, October 5, 2018). Participant 8 indicated that the vendor kept requesting additional funds for key functions of a software upgrade. This participant stated that the red tape to request additional funds for a budgeted project caused significant problems, and, at the beginning of the project, these additional costs were not mentioned by the vendor (Participant 8, personal communication, December 18, 2018). These additional funds did not cause the project to go over budget, but it did cause the project not to be completed within the allotted timeframe. Better communication and project scheduling could have mitigated Participant 8's IT project issues.

Communication, Project Scheduling, and Conceptual Framework. A central component of the sociotechnical theory is the interdependence of the social and technical aspects

in conjunction with the environment (Trist, Higgin, Murray, & Pollock, 1963). An outside vendor being part of an IT project would fall into the "environment" portion of the interdependence between the social and technical aspects. Different environments for IT project management can produce different outcomes. These environmental factors, in these cases the vendors, might be mitigated through variations in project planning and communication plans done at the beginning of the project.

Communication, Project Scheduling, and RQ1. The theme of communication and project scheduling further answered *Research Question 1: What are the common factors that contribute to the high rate of information technology project failure in public universities in Oklahoma.* The participants in this study thoroughly described how difficulties in IT project communication and project scheduling was the primary factor that contributed to IT project failure. In the future, a more inclusive communication plan and including vendors in project scheduling could mitigate this issue.

Emergent Theme 3: Project Interference/Scope Creep. For Participant 5, the factor that contributed to IT project failure came from within the university. There was significant interference in the project in the middle and late stages of the IT project; changing the scope of a project late in the timeline is a well-known cause of project failure (Shirazi, Kazemipoor, & Tavakkoli-Moghaddam, 2017). Changing the scope of the project in a technology environment is even more significant because of the complexity inherent in IT projects. As a project gets further into its timeline, changes bring about new demands on all involved. For Participant 5, the issue was restructuring software, which took a significant amount of time.

In this context, it is difficult to portray the frustration exuded by Participant 5, who stated:

> Basically, some higher-ups at the university thought they knew how to make things better instead of sticking to the plan. They wanted some things changed, but it ended up costing a bunch of extra time. In the end, the changes did not improve the operational components it just made everyone's job harder. (Participant 5, personal communication, October 3, 2018)

There was not a better outcome with the interference which greatly added to the the frustration of the project planners. The university personnel who made the changes to the project was not directly involved in project planning; however, the project manager did keep this person informed while the project was being developed. There were many opportunities, prior to the interference, for changes to be implemented. Making changes earlier in the project might have lessened the impact on the timeline.

Project Interference/Scope Creep and Previous Research. Research indicates that a poorly defined scope is a frequent barrier to project success and clearly defining the scope is under the direction of the project manager (Gobeli & Larson, 1990). The final step in defining project scope is reviewing the scope and deliverables of the project with the end-user (Larson & Gray, 2014). In this case, all of these elements were done, but it still did not prevent interference, which was the primary factor contributing to the failure of this university's IT project.

There are two possibilities/levels/types of scope when discussing changes to scope: scope change and scope creep. Scope change occurs due to an external event, an error in initially defining scope, or a value-added change (Shirazi, Kazemipoor, & Tavakkoli-Moghaddam, 2017). Scope creep occurs when features or functions are added to the project without considering the effect of the project plan or project outcomes (Lehtonen & Martinsua, 2009). In the case of Participant 5, both scope change and scope creep occurred. The interference occurred

to add value to the project; however, that person did not consider the effects the change would have on the project.

In addition to scope change and scope creep, lack of end-user involvement appears the current literature as a common cause of IT project failure (Procte & Businge, 2013). The university personnel that interfered with the IT project was not part of initial project planning (Participant 5, personal communication, October 3, 2018). Even though this individual had been informed through the duration of project planning and execution of the project, if he/she had been directly involved in the project planning, then it might have made the outcome of this project successful. Given this circumstance, any changes needed could have been addressed on the front-end of the project or the individual would have recognized the impact of a late-stage change; this would have provided a greater likelihood that the project would have been completed on time.

Project Interference/Scope Creep and Conceptual Framework. Developing best practices to complete projects successfully is the foundation of project management (Larson & Gray, 2014). In sociotechnical theory, the joint optimization component suggests that developing one-size fits all best practices might not be the most practical way to accomplish project success (Rosacker & Olson, 2008). Based on this, if project managers adjust the social and technical aspects of project management based on the type of project being implemented, then the project might have a reduced possibility of failure (Kwak, Sadatsafavi, Walewski, & Williams, 2015). Directly implementing joint optimization into IT project management might prevent project interference and scope creep.

Project Interference/Scope Creep and RQ1. The theme of project interference and scope creep further answered *Research Question 1: What are the common factors that contribute*

to the high rate of information technology project failure in public universities in Oklahoma. In this instance, Participant 5 thoroughly described how difficulties in IT project interference and scope creep was the primary factor that contributed to IT project failure. In the future, involving those who have the potential to override project plans could mitigate this issue.

Research Question One Summary

Found below, Table 2 indicates the themes that were derived from the participants' interviews based on the triple constraint and whether the participant represented a two-year or four-year university.

Table 2

Themes Derived from Interviews

	Participants from Four-Year Universities						Participants from Two - Year Universities		
Themes	Participant 1	Participant 3	Participant 4	Participant 6	Participant 8	Participant 9	Participant 2	Participant 5	Participant 7
Project was not completed in timeframe	x	x			x			x	x
The vendor could not completed required checklist of necessary changes	x								
IT Project did not deliver all operational components			x	x		x	x		
IT Project did not perform in operational environment like it did in test environment/ software configuration issue/ complexity			x	x		x	x		
There was a lack of 3rd party cooperation		x			x				x
There was interference from other university personnel								x	

Table 2 summarizes information from the phone interviews along with the themes that emerged during the interviews. As shown in Table 2, the interviews revealed the most common cause of IT project failure was the IT project was not completed within the allotted timeframe; this information was given by Participant 1, Participant 3, Participant 5, Participant 7, and Participant 8. The projects not completed within the allotted timeframe were further broken down into three

areas: 1) problems with the vendor (one occurrence), 2) lack of third-party cooperation (three occurrences), and 3) interference from other university personnel (one occurrence).

Table 2 also presents the next common cause of IT project failure where the IT project did not deliver all the operational components intended by the project; this was found in four instances by Participant 2, Participant 4, Participant 6, and Participant 9. In all four of these occurrences, the problem was that the software component did not perform in the operational environment as it had in the test environment. Each situation required correction in the software.

Research question one (RQ1) asked: *What are the common factors that contribute to the high rate of information technology project failure in public universities in Oklahoma?* Based on the themes derived from the interviews, the common causes of IT project failure are listed below in the order of frequency with the first one being the most frequent:

1. A component of new software did not perform in the operational environment as it did in the test environment; in all cases, this was a software configuration issue.

2. There was a lack of third-party cooperation. The implementation of the IT project required outside help and coordination, but this did not happen promptly.

3. A problem with the vendor supplying the new component.

4. Interference from other university personnel.

The results of this research showed a dominant emerging theme, which was the IT project did not deliver all operational components needed because the IT project did not perform in the operational environment as it did in the test environment (study participants, personal communication, September 13, 2018, September 20, 2018, & October 5, 2018). This particular

theme relates to previous literature regarding the complexity of IT projects as a cause of IT project failure (Baccarini, 1996; Oslington, 2004).

There was one factor that contributed to the cause of IT project failure that was specific to one participant in this research. That contributing factor was interference from other university personnel. This factor related to previous literature on the topic of common causes of IT project failure which discusses the importance of defining project scope, maintaining the project timeline, and involving the end-user in project planning (Larson & Gray, 2014; Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016). It should be noted that the previous literature that related to this topic was not in the realm of public universities, but the research did pertain to IT projects.

According to research, problems with project scheduling, scope creep, lack of project definition, complexity, and lack of end-user involvement are common causes of IT project failure (Prater, Kirytopoulos, & Ma, 2017; Swartz & Orgill, 2000; Daniel, 2015; Baccarini, 1996; Procte & Businge, 2013). The results of this study supported the idea that the complexity of the project contributed to IT project failure. In higher education, the operational environment of software integration is more dynamic than in the test environment which creates a problem for software development, adds complexity, and contributes to the failure of the IT project.

Another cause of IT project failure this study found involved interference from other university personnel; this could be a result of not involving end-users in the planning process which resulted in scope creep. Lack of end-user involvement was found in previous research as a common cause of IT project failure (Oslington, 2004). The results of this study did not support the lack of project definition as common causes of IT project failure. Again, the particular needs

of the higher education IT environment could be the cause of the difference between this research and previous research.

Research Question Two

In interview question 1, participants were asked what was the role of the person who led the IT project. The participants were given three choices: 1) a PMP-Certified Project Manager, 2) a Non-PMP Certified Project Manager, or 3) a non-project manager; someone whose primary role is not a project manager. For the most part, all participants gave answers that indicated only one role led the project. However, one participant stated that he was a PMP-Certified Project Manager who led the IT project with help from a non-project manager (Participant 2, personal communication, September 13, 2018). The results from this interview question were that two PMP-Certified Project Managers, two non-PMP Certified Project Managers, and five non-project managers led the IT projects in these public universities.

Research Question Two Summary

The purpose of interview question 1 was to answer research question two. Research question two (RQ2) asked: *What role facilitated the failed IT project in public universities in Oklahoma?* Based on the interviews, Table 3 shows the roles that facilitated IT projects across nine Oklahoma universities:

Table 3

Roles that Led IT Projects in Public Universities in Oklahoma

What Role Led the IT Project	How Many Projects
non-Project Manager	5
PMI Certified Project Manager	2
non-Certified Project Manager	2

As presented in these results, this information is useful for public universities as a cost-saving measure. Public universities can use the results of this study to mitigate better potential problems related to the implementation of IT projects in public universities in Oklahoma. If the project manager role in a university setting considers the uniqueness of what an IT project means to that university, there could be more successful project outcomes.

Application to Professional Practice

Creating competitive advantage is vital in any industry; higher education is no different. Because this study represented common causes of IT project failure, it can be used within public universities to avoid common problems; this would have a multi-faceted effect when implementing IT projects. In consideration of what role facilitated the IT project gives a public university a larger pool of people to choose from when deciding who should lead an IT project because PMP certified project managers are more difficult and more expensive to employ.

Using the results of this study might help public universities use resources, like people and money, more wisely. Public universities are primarily funded with state and federal taxpayer dollars (Gwynne, 2010). Therefore, successfully implementing an IT project would indicate that the university was a good steward of taxpayer dollars. Also, public universities receive private

donations from alumni. In 2015, higher education received $38 billion in private donations (Webb Farley, 2018); this is a vital revenue stream. Successfully implementing IT projects would show private donors that universities view fiscal responsibility as an essential aspect, possibly increasing private donations. This type of fiscal responsibility could contribute to a competitive advantage for a public university.

Additionally, successfully implementing an IT project means less downtime for the end-user. When an IT project fails in higher education, it affects university operations, the instructors, and the students. Most universities use some form of a learning management system (LMS) (Williams & Whiting, 2016). If an integration project, such as an LMS conversion, takes place successfully, then the university gains more credibility from the end-user; instructors and students have no interruption in their ability to facilitate or participate in classwork. Less downtime in operations can also contribute to a competitive advantage for a university.

Relation to Biblical Framework

Jesus gives an excellent example of using resources wisely in Matthew chapter 25 when He tells the parable of the talents. The story revolves around knowing what resources you have and using them to glorify God. Understanding the common factors that cause IT project failure will allow universities to more successfully implement IT projects. When a university becomes more successful at implementing IT projects, it uses valuable sources wisely and saves time and money. Since public universities are supported by the public, saving time and money will allow that university to have a higher standing with the public it serves.

Successfully implementing an IT project means being a good steward and God called us to be good stewards of all He has given. 1 Corinthians 4:1-2 says, “This is how one should

regard us, as servants of Christ and stewards of the mysteries of God. Moreover, it is required of stewards that they be found faithful." As stewards of God, it is the responsibility of Christians in universities to use resources wisely. Developing a process to implement a successful IT project is fulfilling the mandate for how Christians should work.

Recommendations for Action

The results of this research suggest that IT projects are often not completed within the allotted timeframe and, more specifically, there are complications in the operational environment that are not present in the test environment that causes this to occur. Therefore, in future IT projects, public universities should find a better way to simulate the operational environment for software rather than depending solely on how it performs in the test environment. According to Shijun (2018), design management of an IT project is essential to its success; this is directly related to creating a simulation in the test environment that closely mimics the operational environment.

Often universities lack any type of incentive to keep up with the various developments in IT project management (Luukkainen, Vihavainen, & Vikberg, 2012). Therefore, IT projects are implemented like any other project, and the outcomes are often not positive which results in a high IT project failure rate (Stamati, Kanellis, & Martakos, 2005). For a public university to successfully implement IT projects, simulation of the operational environment should occur through a departmental implementation before the IT project is implemented throughout the entire university setting. Simulating the software environment is a crucial component of a successful IT project (Fagerholm, et al., 2018). Departmental implementation would allow the new software to be thoroughly tested in the operational environment, and then if a component

did not work correctly, as this research study found, then the old software could still be used while corrections were made in the coding of the new software.

The results of this research have the potential to affect public universities regarding how resources are used positively. Directors of Information Technology, Chief Information Officers, and project managers, both certified and non-certified, all of whom facilitate IT projects in public universities, might use the information in this research to mitigate the common factors that contribute to IT project failure; this can help them successfully implement future IT projects. The information from this research project will be sent to the twenty-seven public universities in Oklahoma via email to use if desired.

Recommendations for Further Study

Technology advances are inevitable. Therefore, in higher education, one can assume there will be multiple system upgrades, conversions, new software, and many more opportunities for IT projects. Based on the results of this study, there are some further research opportunities.

First, it would be logical to research IT projects in public universities outside of Oklahoma. Research outside of Oklahoma would help confirm the common causes of IT project failure found within public universities in Oklahoma. A study of this nature could be strictly qualitative for comparison purposes.

Another recommendation for further study would be to discover what type of third-party vendors are typically involved in IT projects in public universities. A study of this nature would help establish a basis for reducing the difficulty this aspect of IT projects in public universities currently presents.

Another recommendation for further study would be in the realm of change management that involves the scope of an IT project. A case study could be done to investigate what the outcomes of projects are when the scope is changed at the beginning of a project versus the outcome of the project when the scope is changed at the middle or later in a project.

This current study could be repeated after five years to determine whether the common causes of IT project failure have evolved with technology or if the same difficulties are present. Furthering this topic could aid in the development of a model for IT project implementation within public universities which could have a positive impact overall on the rate of IT project failure in public universities in Oklahoma and elsewhere.

Reflections

Providing new information from the results of this study is valuable. Relying on participants to provide valuable information provided significant tension for the outcomes of this study. There was worry about scheduling interviews and repeatedly contacting participants; finding the line between getting participants and exhausting them was a gray area. The participants were contacted a total of five times each via email and telephone; anything past that could have been received negatively.

The results of this research were not surprising. Based on the literature review and current knowledge of IT project management, the common factors contributing to IT project failure were all expected. In the literature review, much of the information gained was from private entities; there was also an area that discussed IT project management in public entities. What was unclear throughout the literature was whether public universities were included in the

conclusions. Given the information found in this project, the assumption could be made that public universities were included in the literature review data.

Summary and Study Conclusions

This research project studied IT projects in public universities in Oklahoma to determine the common factors that contribute to IT project failure. Also, this research collected data about what role facilitated the IT project conducted in these public universities. The purpose was to collect information that could be useful to the future implementation of IT projects in public universities everywhere, not just in Oklahoma.

The results of this study indicate that the common causes of IT project failure, related to the triple constraint, are:

1. The project was not completed within the allotted timeframe, and

2. The IT project did not deliver all operational components required.

More specifically, problems with software in the operational environment versus the test environment, lack of vendor cooperation, interference from university personnel, and other vendor problems contributed to both time and deliverable problems. Relating to what role facilitated the IT project in this study, five were facilitated by a non-Project Manager, two were facilitated by a PMI Certified Project Manager, and two were facilitated by non-Certified Project Managers.

Expanding on these findings were the themes that developed as the interviews with participants progressed. Emergent theme one was complexity. This theme was experienced by four of the participants involved in this study. Complexity is also in previous research as a

common problem in IT projects (Bakhshi, Ireland, & Gorod, 2016). Emergent theme two was a breakdown in communication and project scheduling where difficulty with communications was directly related to project scheduling problems. This theme was experienced by four of the participants involved in this study. Problems with communication and project scheduling are also in previous research as a common problem in IT projects (Effy & Sosik, 2000; Barclay & Osei-Bryson, 2010). Emergent theme three was project interference and scope creep where project interference by a person in the university led to scope creep. This theme was experienced by one participant. Previous research indicates this is a common problem in IT projects (Shirazi, Kazemipoor, & Tavakkoli-Moghaddam, 2017).

Those who facilitate future IT projects in public universities would increase the likelihood of project success if timeframe and deliverable components were carefully managed. In addition, special attention should be given to the idea that IT projects are commonly more complex, need excellent communication and project scheduling, and should set boundaries on the front end of the project to address interference, and therefore scope creep, that might occur.

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Appendix A

Interview questions

Primary Researcher Script:
For the purposes of this interview, please think about an information technology project (IT) over which you have knowledge and then answer all questions regarding this same IT project at your university. Please choose a project that would be considered a project failure based on time, budget, and/or scope.

For the purpose of this interview, IT projects are one that requires software changes, hardware changes, or integrate new technology.

If there are any questions that you do not know the answer to, please indicate that by stating "I do not know the answer to the question." In addition, if there is a question you do not want to answer, please state, "I do not want to answer that question."

1. What was the role of the person who led the project?

   ____ PMP-Certified Project Manager

   ____ Non-PMP certified Project Manager

   ____ Non-project Manager (Someone whose primary role is not a project manager)

2. Was the IT project completed within the allotted timeframe?

   YES NO

3. If the answer to Question #2 was NO, in your own words tell why the project was not completed within the allotted timeframe.

   _____

   _____

   _____

   _____

4. Was the IT project completed within the allotted budget?

   YES NO

5. If the answer to Question #4 was NO, in your own words tell why the project was not completed within the allotted budget.

   _____

   _____

   _____

   _____

6. Did the IT project deliver all the operational components that were intended?

   YES NO

7. If the answer to Question #6 was NO, in your own words tell why the IT project did not deliver all the operational components that were intended.

   _____

   _____

   _____

   _____

8. Was there any question in this interview that was unclear?

   _____

   _____

   _____