THE RELATIONSHIP BETWEEN PROJECT COMPLEXITY AND PROJECT SUCCESS AND THE MODERATING EFFECT OF PROJECT LEADERSHIP STYLES AND ROLES IN THE CONSTRUCTION INDUSTRY OF AN EMERGING ECONOMY

by

Samuel Kwasi Dartey-Baah

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Supervisor: Professor Mias De Klerk

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RESEARCH IMPACT

The study brings to the fore some pertinent issues surrounding project management and project complexity, especially issues related to complexity by faith, as advanced by Geraldi and Adlbrecht (2007), in the Ghanaian construction industry as a heuristic of emerging economies and how the local mindset and practice might influence its conceptualisation. The study demonstrates how project complexity is conceptualised and how the effects of project complexity on project success should be conceived. The study reveals, particularly, that the influence of project complexity on success does not happen in isolation but is mitigated by various project variables such as project team's experience, information management, and stakeholder engagement. This research demonstrates that subtle but important differences exist between the dimensions of complexity. Therefore, in their efforts to minimise project complexity and improve project success, project leaders should be sensitive to unique project characteristics.

The study makes a contribution to the critical area of project leadership by illuminating how significant strengths and weaknesses of various leadership styles potentially influence success of complex construction projects. Within the project setting, transformational and ethical leadership can minimise the adverse influence of project complexity by creating conditions of trust, respect, empathy and professionalism. In contrast, transactional leadership, with its inherent weaknesses, tends to become inadequate when projects are complex.

The study developed the first project leadership role instrument. By applying the instrument, the study revealed that project leadership roles are integral moderating factors that can buffer the adverse effects of project complexity on project success. The study revealed that fulfilling all the project leadership roles is essential and a source of support when dealing with various complexities, The study, however, also reveals that roles that demonstrate optimism and enthusiasm without compelling and specific actions will not minimise the negative effects of project complexity on project success. The new insights into and results in respect of project leadership roles, which are integral for project success, break the dominant preoccupation of project management scholars with leadership styles and characteristics, through the introduction of practical themes that are essential.

ABSTRACT

Construction projects in most emerging economies provide infrastructural growth that facilitates economic and social development. However, most construction projects fail to meet expected outcomes owing to their complex nature. Various studies have alluded to managerial influences on the nexus between project complexity and project success. With this background, the purpose of the study was to determine how project complexity relates to project success and to explore the potential moderating effect of project leadership styles and roles on the project complexity–project success relationship. The study adopted a mixed-methods approach, the sequential explanatory mixed-methods strategy. Data were first collected and analysed quantitatively and then, based on the findings, qualitative data were collected and analysed to provide deeper insights and a better understanding of the initial quantitative findings. The study was conducted in three main stages involving different sets of samples. The first sample consisting of 10 experts in Ghana's construction industry was obtained using the convenient sampling technique. This sample engaged in assessing the face and content validity of Geraldi and Adlbrecht (2007) project complexity scale and the proposed project leadership role instrument in Ghana's construction industry. The second stage of the data collection involved 315 participants from Ghana's construction industry who were conveniently sampled for the quantitative survey. The final data collection involved 20 participants, who were conveniently sampled from the participants who took part in the main survey for the purpose of qualitative interviews. The quantitative data were collated using an Excel spreadsheet and exported into SPSS (Version 20) and Amos (Version 22.0). Covariance-based structural equation modelling (CB-SEM) was used in analysing the quantitative data. The qualitative data were transcribed, collated, and analysed using thematic analysis. The researcher ensured that all ethical considerations were strictly adhered to throughout the study. The study's findings confirmed results from previous studies of the negative relationship between aspects of project complexity and project success, although the relationship of project complexity as a composite construct with project success was insignificant. Analyses of the qualitative data revealed that this might be due to the participants' understanding of the implementation of mitigating measures to deal with complexity. For instance, experienced project teams working on complex projects contributed to reducing the negative effect of project complexity on project success, albeit at a higher cost. The net effect of the success of projects can thus be neutral or the determination of success of large construction projects can become ambiguous. The findings of the study confirmed that transformational and ethical leadership styles are important to ensure project success and positively moderate the insignificant relationship between project complexity and project success. The transactional leadership style had no significant effect on project success and did not moderate the project complexity–project success relationship and did not engender project

success. Furthermore, the study showed that project leadership roles significantly moderate the relationship between project complexity and project success.

The findings demonstrated how project complexity should be approached because of the uniqueness and influence of each of the dimensions of complexity. For complexity associated with novelty and uncertainty, experience plays a significant role in ensuring project success. Complexity of fact relates to proper decision-making that is guided by reliable information and skilled personnel. Complexity of interaction requires proper stakeholder engagement and communication. The study also sheds light on some of the expectations of project teams concerning how project managers should lead large and complex construction projects in order to promote the probability of success. The demonstration of trust, respect, and concern creates a positive environment that encourages project teams to work hard in difficult times. Particularly, project managers can create an environment that eschews corrupt practices through the demonstration of exemplary behaviours such as fairness, openness, and professionalism. Considering the fact that corruption contributes significantly to project failure and is widespread in construction projects, the management of ethics must be designed to fight corruption in such projects. One way to operationalise ethical behaviours is to have leadership put in place structural mechanisms for managing ethics. This should include monitoring ethical behaviours among project teams, communicating ethical polices, creating channels for reporting ethical violations, promoting ethical training, and putting in place sanctions for corrupt and unethical practices. Despite research work on the concept of leadership being conducted over many years, studies have not yielded any comprehensive definition of leadership that embraces unique project situations such as handling complex projects. This is because leadership can be understood, not only in different fields, but in different ways. Leadership has different connotations within the same field. Studies on leadership which have focused on traits and behaviours as a means of unearthing effective leadership have been criticised as being too idealistic. Some scholars have suggested that, rather than focusing on leadership traits and behaviours, project leaders could focus on performing essential project leadership roles. To address this, the study identified key leadership roles relevant to the project environment through an extensive literature search. The main contribution of the study to the field of project management is the conceptualisation of project leadership roles and the development of the project leadership role instrument. Furthermore, this study's recommendation to shift the preoccupation of mainstream leadership literature from leadership styles to more practical leadership roles that are suitable for large construction project environments is a unique and innovative contribution to the body of knowledge on project leadership.

Keywords: *construction industry, Ghana, leadership styles, leadership roles, project complexity, project success*

DECLARATION: PLAGIARISM

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16 Hamilton Mews
Dulcie Close
Lone Hill, Johannesburg
9 September 2021

Stellenbosch Business School
PO Box 610
Bellville, Cape Town
7530

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Julie Streicher
English language editor

Professional EDITORS Guild

Julie Streicher
Full Member

Membership number: STR005
Membership year: March 2021 to February 2022

083 303 5484
julie.streicher@redtrumpet.co.za
www.redtrumpet.co.za

www.editors.org.za

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No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude – Alfred North Whitehead

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1. INTRODUCTION

The importance of project complexity in project management is widely acknowledged for various reasons (Floricel et al., 2016; Nguyen et al., 2019). Bashki et al. (2016) indicated that research has elucidated the negative effects that project complexity has on project success in terms of: unit-cost outcomes (Tatikonda & Rosenthal, 2000); project efficiency and effectiveness (Hanisch & Wald, 2014; Sicotte & Bourgault, 2008); and project budget and schedule (Floricel et al., 2016). Project complexity further affects project success by adversely influencing budget and deadlines (Bjorvatn & Wald, 2018; Bosch-Rekveldt et al., 2011). In the light of such research, project complexity has been cited as one of the most crucial areas relating to project success in the project management literature and as a major component of projects that influence project outcomes (Bakhshi et al., 2016; Burke & Morley, 2016).

Researchers have defined project complexity in different ways. William (2002) defined project complexity as the randomness (uncertainty) and structural complexity that surround projects. Geraldi and Adlbrecht (2007) expanded William's (2002) definition of project complexity by incorporating aspects of project complexity proposed by Dvir et al. (2006), San Cristóbal (2017) and Shenhar (2001). Geraldi and Adlbrecht (2007) proposed three types of project complexities: complexity by faith, complexity by fact and complexity by interaction. C*omplexity by faith* is about the complexities that accompany the process of creating "something unique, solving new problems, or dealing with high uncertainty" (Geraldi & Adlbrecht, 2007, p. 3). The tasks comprising this kind of complexity are vague and cannot be solved with "off-the-peg" solutions, predefined procedures or answers. Thus, one will be trying different approaches, and learning by doing. Consequently, first attempts at dealing with a novel situation tend to have to be modified and the scope will constantly change (Wu & Pagell , 2011). Therefore, the progress of the project depends on the project team's understanding of the issues that have to be addressed (Wu & Pagell, 2011). *Complexity by fact* is the complexity in handling a huge volume of interdependent information (Geraldi & Adlbrecht, 2007, p. 3). *Complexity by interaction* is about the complexities that arise from interacting with people and organisational structures (Geraldi & Adlbrecht, 2007). For instance, the complexity by interaction manifests in the form of ambiguity, politics, multiculturalism and the degree of transparency associated with a project. Complexity by interaction relates to Baccarini's (1996) description of organisational complexity, which arises because of the formation of a temporary multi-organisational structure to manage a project.

Project complexity has consistently been demonstrated to negatively influence project success (Floricel et al., 2016; Hanisch & Wald, 2014; Sicotte & Bourgault, 2008). Project success continues to be a high expectation in the operation of most organisations and therefore is a major preoccupation for both project management researchers and practitioners alike (Schoper et al., 2018). A study of over 10 640 projects by PricewaterhouseCoopers (PwC) reported that only 2.5% of the companies sampled completed 100% of their projects successfully. The rest either failed to meet some of their original targets or missed the original budgets or deadlines. Lehtiranta et al. (2012) asserted that metrics related to cost are essential project success determinants.

Research on the relationship between project complexity and project success has not focused much on emerging economies (Bjorvatn & Wald, 2018; Floricel et al., 2016; Hanisch & Wald, 2014; Kermanshachi et al., 2016; Müller & Jugdev, 2012; Sicotte & Bourgault, 2008; Tatikonda & Rosenthal, 2000). Various scholars called for the expansion of project management research into solving socioeconomic problems engulfing emerging economies (Golini et al., 2015; Iqbal et al., 2020; Lawani & Moore, 2016). The construction sector of developing countries is a strategic industry with close connection to other developmental sectors (Amoatey et al., 2015; Damoah & Kumi, 2018; Osabutey et al., 2014).

In emerging economies, the construction industry is considered to be one of the most important industries because it is associated with nearly all fields of human endeavour (Eja & Ramegowda, 2020; Long Duy Nguyen & Ogunlana, 2004; Tabish & Jha, 2011). Construction is vital for the development of any nation and the physical development of construction projects such as the establishment of buildings, roads, and bridges is the measure of their economic growth. Numerous studies have demonstrated that, in emerging economies, growth and development are largely achieved through construction activities which are more often initiated as significant components of government developmental plans (Eja & Ramegowda, 2020; Long Duy Nguyen & Ogunlana, 2004; Nzekwe et al., 2015; Tabish & Jha, 2011). The contribution of such government construction projects cannot be underestimated as they serve as the foundation for the rest of the economy to grow. The success of construction projects is therefore a fundamental concern for most governments and communities. Construction projects are naturally complex owing to the associated level of uncertainty, the need for novelty and technical capability, and the difficulty of managing varied stakeholders. The dynamics of most construction projects in emerging economies do not create the ideal situation for project success (Wu et al., 2018).

The success of construction projects in emerging economies is influenced by a myriad of factors such as the competence of project managers, and project management knowledge including knowledge in planning and estimating project activities (Eja & Ramegowda (2020). Research indicates that some construction projects in emerging economies fail as a result of delay, cost overrun, non-adherence to regulatory standards, total abandonment, and resource scarcity (Eja & Ramegowda, 2020; Tabish & Jha, 2011). The Project Management Institute (PMI, 2013) noted that project risk and availability of quality resources are equally critical determinants of project success. Although conformance to time and technical specifications are useful and widely considered as determinants of project success, researchers have also identified the satisfaction of stakeholders as a measure of project success (Alias et al., 2014; De Carvalho et al., 2015; Müller & Jugdev, 2012). Construction projects are highly capital-intensive and often require specialised tools and equipment to finance these capital-intensive projects. Since most countries in emerging economies often rely heavily on external resources to fund their construction projects, the absence of these external resources often leads to the abandonment of such projects.

The success of construction projects is also influenced by the extent of project management knowledge. Generally, across most emerging economies, project management knowledge is limited, and this can be traced to the absence of formal training in the discipline (Eja & Ramegowda, 2020; Narayanan & Huemann, 2021). In a study on project teams in Pakistan, it was found that the leadership style of project managers has a significant influence on project success (Bhatti et al., 2021).

Leadership has been widely described as a crucial factor in projects (Floricel et al., 2016). Effective project leadership can enhance effective and efficient team building, team communication, cohesion, and teamwork, which are likely to improve the success of projects (Yang et al., 2011).

The Project Management Institute (PMI, 2007) states that:

> To a large extent, project success depends on human behaviour – particularly the behaviour of the team leader. Good leadership skills enable a project manager to harness the energy and capabilities of a project team in such a way that the performance of the team is greater than the sum of its parts. Leadership is widely accepted as the critical factor in determining the ultimate success or failure of a project.

Müller et al. (2011) contended that the leadership styles and competencies (emotional, intellectual, and managerial) of project leaders are crucial in dealing with project complexities and successfully managing the project. By exhibiting behaviours that enable project leaders to adequately understand

and handle complexities that might be present in a particular project leaders are likely to influence the relationship between project complexity and project success through their leadership styles and approaches (Hanisch & Wald, 2014; O'Donnell, 2010).

Indeed, some studies have demonstrated that transformational leadership tends to have a positive impact on project success (Aga et al., 2016; Anantatmula, 2010; Raziq et al., 2018a; Strang, 2005a). De Klerk (2014) posited that contemporary leadership theories and approaches, such as transformational and ethical leadership, need more research attention and examination in the project setting. In some developing countries, the lack of controls on how government officials behave and their power – combined with the structural and financial complexities of projects – make it relatively easy for officials to extract bribes. Such unethical behaviours by government officials compromise the quality of project deliverables, leading to poor outcomes (Transparency International Report, 2005). Despite the interrelationship between ethical leadership and transformational leadership (Aga et al., 2016; Anantatmula, 2010; Raziq et al., 2018; Yang et al., 2011), the role of ethical leadership, and its connection with project success in the construction industry, has not been given much attention, especially in the emerging economies and the African setting. De Klerk (2014) contended that preoccupation with traits and qualities as a means of unearthing effective leadership is too idealistic. He suggested that rather than subscribing to long lists of leadership traits and behaviours, project leaders could focus on performing essential project leadership roles (i.e., direction setter, ethical tone-setter, energiser and mobiliser, catalyst of possibilities, compassionate anchor, orchestrating driver and integrator). These roles are postulated to have positive implications for project success (Bathallath et al., 2016).

This study examines the relationships between project complexity and project success, as well as the potential moderating effect of project leadership styles and roles on the project complexity–project success relationship in the construction industry of an emerging economy, namely Ghana. The study seeks to expand the understanding of interrelationships between project complexity, project success, project leadership, and project leadership roles in the emerging economies context. By examining potential drivers of project success in the construction industry of an emerging economy, this study may make a meaningful contribution to advancing efforts focused at solving some of the issues associated with socioeconomic development in developing countries.

This study consists of eight chapters. Chapter 1 serves as the introduction to the study by presenting the background to the study. Chapter 2 provides a review of relevant literature. It also discusses project complexity and project success both globally and in Ghana's construction industry. Chapter 3

comprises the problem statement and the objectives of the study. Chapter 4 contains the research methodology, while Chapter 5 presents the findings on the validation of project complexity and project leadership role instruments. Chapter 6 presents the results of the quantitative analyses, while Chapter 7 presents the findings of the qualitative analyses and unearths the underlying reasons for the quantitative results. Chapter 8 presents the conclusions and recommendations based on the discussions and analyses in the study. Chapter 8 also sets out possible contributions of the study to practice and policy. Additionally, this final chapter presents the limitations and recommendations for future study.

2. LITERATURE STUDY

2.1 Introduction

Chapter 2 firstly defines, and distinguishes between, project failure and project success and discusses project failure and success in emerging economies. It then defines project complexity and explains how project complexity relates to complexity theories. Thereafter, the discussion on project success and project complexity in emerging economies is elaborated upon. Following this, the chapter discusses the various influences project leadership has on project success, including the effect of project leadership roles on the project complexity–project success relationship. Chapter 2 then concludes with an extensive discussion on Ghana's construction industry.

2.2 Project Failure and Success

The 2015 *Global Construction Project Owner's Survey* by KPMG International indicated that over a period of three years (2011–2014) only a quarter of construction projects were completed close to their set deadlines and budgets, and just one in 10 public sector organisations were able to meet this target (KPMG, 2015). Wood and Gidado (2008) indicated the importance of increased research to enhance understanding of the role of complexity and its management and influence on construction projects.

Amponsah (2010) asserted that the construction industry has great potential to meet countries' developmental needs through the development of infrastructure. This is particularly relevant to emerging economies. Therefore, the success of construction projects is imperative for governments, customers and communities (Ramlee et al., 2016).

2.2.1 Defining Project Success

The advancement of project management, as well as the competitive project environment, has necessitated that both scholars and practitioners examine the causes of project failure and success in order to improve the outcomes and delivery of projects (Alias et al., 2014). The definition of project success has become a salient discussion topic in project management, and considering the high rate of failure of projects, researchers and practitioners are focusing on various ways of mitigating project failures and improving project success (Hassan et al., 2017a; Lehtiranta et al., 2012; Sebestyen, 2017). Every project is started with the aim of success. However, although project success is one of the most often discussed topics in project management, there is still no universally accepted definition for project success, owing to the elusive nature of the construct (Kerzner, 2017; Prabhakar, 2008; Shenhar & Dvir, 2007; Alias et al., 2014). According to Karlsen, Andersen and Berg-Knutsen (2017, p. 85), "A project is considered a success by most project managers when the project is finished on time, within

budget, and according to the specifications". However, project success is more complex than simply staying within budget, schedule, and performance criteria (Karlsen, Andersen & Berg-Knustsen, 2017). Table 1 provides a summary of some of the prominent definitions of project success.

Table 1
Definitions of Project Success

Authors	Definition	Key Themes
Pinto and Mantel (1990)	A project is successful when it conforms to three aspects of project performance, which are implementation process, perceived value, and client satisfaction.	• Perceived value • Stakeholder satisfaction
Cooke-Davies (2002)	Achievement of project goals denotes project success.	• Goal attainment
Belout and Gavreau (2004)	Project success is the fulfilment of requirements pertaining to schedule, cost and quality.	• Schedule, cost and quality
Boddy and Paton (2004)	The effective management of project structures and competing stakeholders' interest are critical to project acceptance and hence project success.	• Effective project structures • Active stakeholder involvement
Pinto and Slevin (2006)	Project outcomes conforming to quantifiable and subjective assessment criteria demonstrate success.	• Goal attainment
Shenhar and Dvir (2007)	Success is measured by achievement of outcomes such as project efficiency, positive effect on the client, positive effect on the team, direct business and organisational success, and preparation for the future.	• Goal attainment • Stakeholder satisfaction
Ika (2009)	Project success is a multidimensional concept which corresponds with a project's efficiency and effectiveness	• Efficiency • Effectiveness
Shao et al. (2011)	Project success is when the outcome of the project has an impact and satisfies customers.	• Satisfaction of customers • Project impact
Project Management Institute (PMI, 2013)	Project success is achieved when the project aligns with planned goals and the creation of wealth.	• Goal attainment • Wealth creation
Alias et al. (2014)	A project is successful when its outcomes fulfil the expectations of owners, planners, and contractors within the parameters of time, cost and quality.	• Time, cost, quality, • Stakeholder satisfaction
Serra and Kunc (2015)	Project success refers to making a profit and achieving organisational goals and creating wealth.	• Goal attainment • Wealth creation
Joslin and Muller (2015)	Project success is not limited to meeting the iron triangle of project performance expectation of time, scope and cost, but also stakeholder satisfaction.	• Time, scope, cost • Stakeholder satisfaction
Rezvani et al. (2016)	Project outcomes that conform to goals, such as completion timeliness, quality, and control, denote success.	• Goal attainment (hard factors)
Yan et al. (2019)	Success has to do with achieving organisational strategic goals, construction programme performance expectation, social harmony, and project stakeholder satisfaction.	• Goal attainment • Wealth creation • Stakeholder satisfaction

From Table 1 it can be seen that the various definitions broadly describe project success in both subjective and objective terms. The subjective factors reflect stakeholder perceptions about the outcomes of the projects according to their expectations and needs. Definitions of project success that reflect subjective dimensions culminate in a multifaceted and multicriteria approach. The challenge

associated with a multifaceted approach reflecting stakeholder perception is that different stakeholders of a project, including the project manager, employees, suppliers, merchants, clients, executives, and third parties, all have diverse expectations and needs, and therefore have different views on project success (Beleiu et al., 2015; Ramos & Mota, 2016). The objective factors consider project success as the fulfilment of specific measurable and quantifiable outcomes such as time, quality, and cost. These quantifiable outcomes emanate from specification by owners, engineers, planners, and contractors. Subjective and objective factors are similar because they both emanate from relevant stakeholders. In contrast, the objective dimensions of project success focus on size, quality, and time and are easily measurable, but inadequate to comprehensively capture the success of a project. The subjective factors, on the contrary, are behavioural and perceptual and are much less quantifiable and measurable, demonstrating the complexity of measuring project success in a clear and undisputed manner.

One approach to define project success is to distinguish between project success and project management success (Cooke-Davies, 2002; Ika, 2009). Project managers are often confronted with the challenge of dealing with issues that affect the medium to long-term sustainability of projects. The traditional notion of project management has largely been preoccupied with dealing with present project issues in order to deliver projects within a definite time and budget. The task of managing the project (time, cost, and budget) happens to fall to the project manager. In this regard, fulfilling project requirements, such as time, cost and quality, become a product of management success. Project management involves planning, organising, monitoring and controlling of all aspects of a project in order to achieve project goals in a manner that is within the agreed schedule, budget and performance. Project management is therefore focused on project performance with short-term dimensions of project success, such as the adherence to the criteria of time, cost and quality. Project success is measured against the overall objectives of the project, while project management success is measured mostly against cost, time and quality. From this perspective, it is possible to have a successful project with unsuccessful project management, as project success does not ultimately lead to project management success.

Further, the success of a project also depends on the level of stakeholder involvement and the management of stakeholder interests. How project managers deal with stakeholders' differences particularly for complex projects with competing stakeholder interests, affects the quality and acceptability of the project. As such, the need for project managers to be open to competing views, while operating within the project scope, is critical to delivering project success (Boddy & Paton (2004).

Project success can mean different things to different stakeholders. The most common approach to defining project success considers such success as meeting the project's budget, schedule, and an acceptable level of quality (Cooke-Davies, 2002; Rezvani et al., 2016; Serra & Kunc, 2015; Yan et al., 2019). This definition of project success typically measures the project on meeting the planning objectives. Belout and Gauvreau (2004) described a wider range of the planning objectives, including project requirement fulfilment, schedule compliance, cost compliance, the contribution of common culture and values, project output quality, solution for challenges connected to the project, and project output profitability. Planning objectives indicate the overall goals of the project and may not be specific or comprehensive enough to cater for the needs of end-users or general stakeholders. Therefore, when projects meet planning objectives, they may not necessarily meet the needs of end-users or more generally stakeholders.

Based on the previous discussions, project success can be considered a multidimensional concept with both subjective and objective dimensions. The objective dimension largely conceptualises project success in terms of fulfilling project goals pertaining to time, cost, and quality. The subjective dimension is more stakeholder-focused and largely conceptualises project success as an outcome of perceptions of stakeholders. Both the objective and subjective dimensions are valid indicators of project success, because a project that fulfils the objectives of quality, time, and cost may not necessarily satisfy the stakeholders. Similarly, projects that satisfy stakeholder expectations do not necessarily guarantee expediency and efficiency in cost, time, and quality. Since both subjective and objective dimensions are important, any definition of project success must encompass both these dimensions. As such, project success is defined in this study as “a project that is completed within a reasonable schedule and stipulated scope, meeting the expected quality standards with minimal budget deviations, satisfying the expectations and requirements of its various relevant stakeholders, and provides future opportunities for the organisation” (Shenhar & Dvir, 2007).

2.2.2 Project Success and the Construction Industry

Construction is a term associated with activities involving the creation of physical infrastructure and other relevant facilities (Fernández-Solís, 2008; Foulkes & Ruddock, 2007). Anaman and Osei-Amponsah (2007, p. 953) indicated that the construction industry includes “firms and activities directly involved in the construction of buildings, private and public infrastructure, as well as all economic activities directed to the creation, renovation, repair or extension of fixed assets in the form of buildings, land improvements of an engineering nature and other such engineering constructions as roads, bridges and dams.” Generally, the construction industry comprises three subsectors: residential, commercial, and infrastructure (Famiyeh et al., 2017; Foulkes & Ruddock, 2007). The

residential subsector involves the construction of single-family houses and multi-family dwellings. Residential construction is typically affected by financial conditions, pricing laws, and the monetary laws or regulations of the government. Commercial construction covers different projects such as schools, recreational centres, hospitals, sports stadiums, warehouses, and manufacturing plants (Allen & Iano, 2019; Zhang et al., 2018). Infrastructure constructions typically involve more complex projects such as the construction of bridges, drainage systems, pipelines, seepage frameworks, and sewage treatment plants. A large portion of these undertakings is usually owned and financed by the government through bonds or duties.

The construction industry forms a major part of the economy in most countries and serves as a source of employment for many people. The development and standard of living in every country are established on the basis of projects such as roads, schools, residential units, and hospitals (Wu et al., 2018; Xia et al., 2018). The products of construction activities go a long way to create wealth and promote the quality of life of people (Ibrahim et al., 2010; Xia et al., 2018). Construction activities can produce wages even in communities that are deprived and consequently reduce poverty. Additionally, the construction industry contributes to the social and economic progress of countries. Infrastructure such as schools, hospitals, and roads form part of the nation's backbone and offer social and welfare benefits to the people (Mukuka et al., 2015).

The construction industry usually faces various challenges because of some of the characteristics of construction activities (Allen & Iano, 2019). Construction activities are typically characterised by enormous risks in terms of health and safety (Alavifar & Motamedi, 2014; Pinto et al., 2011). Construction projects generally consist of a variety of activities and involve numerous stakeholders with various influences and interests. These prevailing challenges such as risks, health, and safety concerns, and stakeholder interactions and influence add complexity to projects, which have implications for project success.

2.2.3 Project Success and Failure in Emerging Economies

Project success, or rather the lack thereof, is a major problem in emerging economies. The failure of construction projects in emerging economies can be traced to corruption and lax regulations for construction activities (Daniel & Ibrahim, 2019). The high prevalence of corrupt practices minimises the success of construction projects in emerging economies (Eja & Ramegowda, 2020; Long Duy Nguyen & Ogunlana, 2004; Nzekwe et al., 2015; Tabish & Jha, 2011). Also, instances of political interference and lack of accountability and transparency in government construction projects means

that government officials are able to engage in corrupt practices that lead to cost overruns (Daniel & Ibrahim, 2019).

Eja and Ramegowda (2020) add to the discussions on the lack of project success in emerging economies by stating for that, for example, in Nigeria, construction projects fail owing to factors such as inaccurate costing, incompetence of project managers, lack of project management knowledge, poor planning and estimation of project activities, poor communication, frequent design and scope changes, and consultant and contractor corrupt practices. In the sub-Saharan region, project failures and even project abandonment are not uncommon (Daniel & Ibrahim, 2019). Daniel and Ibrahim (2019) cited bureaucracy and corruption, lack of proper project planning, poor communication, and unrealistic estimation of cost and time as some reasons for lack of project success in emerging economies. Furthermore, wastage and underutilisation of manpower and resources, and disputes among project stakeholders were found to be factors that contributed to project failure in Nigeria (Daniel & Ibrahim, 2019).

A study in India found that the inability of project managers to effectively manage project teams, lack of technical know-how in guiding project activities, poor estimation of project activities, and management of project budgets are factors that affect the success of projects (Narayanan & Huemann, 2021). Land acquisition challenges and the associated high transaction costs were also found to be contributory factors to project failure (Narayanan & Huemann, 2021). In South Africa, Maseko (2017) suggested that project complexity, technical know-how of the project manager, project manager's unwillingness to seek assistance, and non-application of project management practices hinder the success of projects. For example, Zuo et al., (2018) found that unsuccessful projects in Vietnam are characterised by ineffective team work, delays, cost overruns, and poor quality of projects. In Yemen, poor communication practices (lack of feedback, poor communication channels) among project teams were found to lead to project cost overruns, time overruns disputes and then project failure (Gasmil & Rahman, 2020).

A study in Vietnam on essential skills of project managers that contribute to project success identified that the project manager's communication ability, negotiation skills, problem-solving skills, conflict management skills, intellectual capacity, and ability to motivate the project team were critical factors for successful project outcomes, with conflict management skills ranked the important factor (Zuo et al., (2018). Alotaibi (2019) also reported that, in Saudi Arabia, project integration management (properly aligning project activities and ensuring a seamless flow of work) was the most important indicator of project success among factors like time management, cost management, risk

management, procurement management, human resource management, and communication management. Enyinda (2016) added that project managers in emerging economies often miss opportunities because they are unable to pre-empt potential project risks.

A study in Pakistan, which involved understanding key factors that influence project success, found that the leadership style of project managers was fundamental to the success of projects (Ali et al., 2021). Specifically, the study found that humble leadership – explained by Owen and Hekman (2012) as willingness to perceive oneself accurately, appreciation of capabilities of others, and openness to new ideas and suggestions – was an essential factor for successful project outcomes. Eja and Ramegowda (2020) found that sociocultural and political interference and poor leadership led equally to project failure. Bhatti et al. (2021) also found a positive correlation between ethical leadership and project success, while Castro et al. (2020) identified that skills such as emotional intelligence had more impact on project success than technical skills. Managing construction projects is a challenging job and requires project managers with effective people management skills to succeed, especially when dealing with multidisciplinary teams (Zuo et al., 2020).

A study in Brazil established that project efficiency, customer impact, direct business, organisational success, organisational benefits, and stakeholder satisfaction are elements that contribute to project success (Castro et al., 2020). A study by Heravi and Ilbeigi (2012) on indicators of project success found stakeholder satisfaction to be an important indicator in defining project success in Iran.

In Ghana, factors that contribute to construction project failure were found to include political interference, delays in payment, partisan politics, bureaucracy, corruption, poor supervision, lack of commitment by project leaders, poor planning, starting more projects than government can fund, and non-continuance of projects started by previous governments by incoming governments (Damoah & Kumi (2018).

Project failures in emerging economies can therefore be attributed to a myriad of factors. Some of the more common causes are corruption, ineffective management of varied stakeholder interests, poor leadership, lack of project management know-how, and unethical and corrupt behaviours of project teams. All these factors contribute to the complexities of projects in the construction industry and ultimately affect project success outcomes in emerging economies.

2.2.4 Project Complexity

Construction projects are usually depicted as complex and when not well managed, could lead to poor outcomes (Wu et al., 2018; Xia et al., 2018). Project complexity is widely considered to be negatively

related to project performance and success (Hanisch & Wald, 2014; Luo et al., 2017; Tatikonda & Rosenthal, 2000). Project complexity has been extensively explored in research owing to its contribution towards cost and time overruns of major projects (Qazi et al., 2016). Project complexity as a major source of uncertainty leads to additional costs and has a substantial impact on project performance if a project team fails to address it from the early phase of the project life cycle (Floricel et al., 2016; Shenhar et al., 2002; Williams, 1999). Nguyen et al. (2019) found that project complexity is a key factor affecting cost and schedule performance in the project delivery selection process. Ishtiaq and Jahanzaib (2017) suggested that project complexity is one of the main causes behind the failure of many projects. However, Vidal and Marle (2008) asserted that the connection between project complexity, risk, uncertainty, and the performance of a project (i.e., its success or failure) is not clear.

In order to attain success in projects for all stakeholders, it is pertinent to understand project complexity and its proper management (Wood & Ashton, 2009; Wu et al., 2018). Mills (2001) portrayed the construction industry as a dynamic, risky and challenging sector. Mills (2001) further indicated that the industry is unable to adequately handle the risks it faces and effectively achieve project outcomes. The following discussions provide various definitions of project complexity and its dimensions.

2.2.5 Defining Project Complexity

Complexity is a common and pervasive project phenomenon that has gained scholarly interest, also in the area of project management. In spite of the numerous studies on complexity, there is still no commonly accepted definition of complexity (Antoniadis et al., 2011; De Rezende & Blackwell, 2019; Lu et al., 2015; Wu et al., 2019). According to Dao et al. (2016, p. 478), “one of the difficulties in addressing the topic of project complexity is that the term is broadly and intuitively applied, without a standard definition, explanation or conceptualisation.” Some scholars for example have considered project complexity as a "know it when you see it phenomenon," suggesting that the construct of project complexity is often defined on the basis of subjective observation, which generally does not engender consensus (Mozaffari et al., 2012; Parsons-Hann & Liu, 2005; Zhu & Mostafavi, 2017).

Table 2 presents key factors and a summary of definitions of project complexity as conceptualised by some researchers on the subject.

The various authors in Table 2 have sought to understand, define, and determine the concept of project complexity. These authors have propounded various approaches in conceptualising project

complexity, and, although there is no universal agreement on a specific definition of project complexity, there are some similarities in the project attributes associated with complexity. The difference between these definitions of complexity is that each refers to a different set of project attributes when defining project complexity. These attributes include interdependencies of elements, uncertainty, difficulty, and unpredictability in controlling project elements. Generally, these attributes espoused by the definitions are linked to technical or structural complexity dimensions (Bosch-Rekveldt et al., 2011). Structural complexity refers to attributes such as technological uncertainties, number of tasks, the newness of an experience with technology or clarity of goals, and uncertainty (Luo et al., 2017; Bentahar & Ika, 2019). The various definitions tend to lean more towards a descriptive sense of complexity and consider complexity to be made up of attributes of the project beyond that which can be measured and quantified.

From Table 2, the works of authors such as Custovic (2015) and Maier et al. (2015) suggest that project complexity is subjective, depending on perception and is more related to the understanding and experience garnered through interactions with the system. Considering complexity as an issue of perception implies difficulty in comprehending and dealing with certain project situations. Attributes such as difficulty and unpredictability are born out of experience and exposure, and interaction with the project system and are, therefore, perceived by the observer. Other definitions approach complexity from an eclectic perspective and describe complexity as that which is perceived (Bosch-Rekveldt et al., 2011; Geraldi & Adlbrecht, 2007).

Table 2
Definitions of Project Complexity

Authors	Definition	Key Factors
Baccarini (1996)	Project complexity is defined as the number of varied elements and interrelatedness activities between project elements.	• Interdependencies • Differentiation
Geraldi and Adlbrecht (2007)	Project complexity is the pattern of a project characterised by interrelationships and dynamism	• Interdependency • Uncertainty and novelty • Interaction
Vidal and Marle (2008)	Project complexity is the component of a project that makes it hard to comprehend, to predict and to control its general behaviour, even when practical information about a project's system is provided.	• Understanding • Unpredictability • Control
Bosch-Rekveldt et al. (2011)	Project complexity is the degree of differentiation and interdependencies, and connectivity in a project that is regulated through cooperation, coordination, communication, and control Technology- Organisation-Environment (TOE) framework.	• Technical • Organisational • Environment

Authors	Definition	• Key Factors
De los Ríos-Carmenado et al. (2013)	Project complexity is defined as different issues that consist of many components that have several possible connections.	• Interconnection
Maier, Rainey & Tolk (2015)	Project complexity is defined as the internal and external challenges and conflicts across factors such as the operational and managerial connection of components, transformative development, emergent conduct, and geographic distribution.	• Conflict/challenges • Change • Geography
Custovic (2015)	Project complexity is denoted by the characteristics of a system that make it hard to frame in language, even when practical information about its atomic component and connections are given.	• Unpredictability
Dao et al. (2016)	Project complexity is a project phenomenon lodged between project difficulty (the difficulty of the project) and project risks (uncertainties).	• Difficulty • Uncertainty
Bakhshi et al. (2016)	Project complexity is characterised by some traits of severity, which make it difficult to forecast its effects or to regulate and cope with the project.	• Unpredictability • Control
Damasiotis & Fitsilis (2019)	Project complexity is a characteristic of the elements of a system and a subjective experience by an individual upon interacting with a system.	• Descriptive • Perceived
Lu et al. (2020)	Project complexity is characterised by lack of communication, understanding and mutual trust, policy, management style, and organisational cultural differences.	• Ineffective management
Abbas & Erzaij (2020)	Project complexity is associated with interdependencies between tasks that require different techniques, including the generation, usage, transmission, and feedback of information.	• Interdependence

The Technology-Organisation-Environment (TOE) framework (Bosch-Rekveldt et al., 2011) in Table 2 contains elements related to structural complexity and perceived complexities the main categories of project complexity. The technical complexity and organisational complexity relate to Geraldi and Adlbrecht's (2007) work on complexity by fact and complexity by interaction, respectively. Most of the elements in the technical category of the framework have a structural character, like the number of goals, broadness of scope, number of tasks, dependencies between tasks. In the TOE framework, softer aspects and the environment external to the project are explicitly included. Softer aspects can be recognised in both the organisational and environmental categories in the TOE framework elements, such as trust, availability of resources and skills, experience with parties involved, and interfaces between disciplines involved. The environmental aspects of the TOE framework align with Geraldi and Adlbretcht's (2007) work on complexity by interaction. The environmental category further covers elements such as political influence, level of competition, strategic pressure, required local content, interference with existing site, and weather conditions.

The conceptualisation of project complexity by Geraldi and Adlbrecht (2007) is based on a pattern of complexity which is made up of an interrelated and dynamic set of characteristics of complexity. Geraldi and Aldbrecht (2007) made a case for definitions of complexity to capture the patterns of

complexity rather than mere characteristics, as it is practically impossible to consider all the characteristics of complexity. Particularly, when confronted with a project situation, individuals can only perceive a certain number of complexity characteristics. When the context is considered, individuals may rate complexity differently and react differently. In this regard, the set of characteristics perceived, as well as the intensity of the characteristics, is dynamic and constructed as it evolves. Therefore, Geraldi and Adlbrecht (2007) classify project complexity into three typologies based on the patterns of complexity, namely complexity by faith, fact and interaction. Complexity by faith is associated with the randomness of the unknown and unforeseen, whereby one enters into projects based on faith in order to be able to deal with the evolving aspects, rather than relying on plans (Geraldi & Adlbrecht, 2007). This type of complexity consists of dealing with challenges, numerous options, and many decisions; yet there is very limited factual information available for use (Chapman, 2016). Complexity by fact denotes complexity in managing high volumes of related information. The challenge associated with complexity by fact is about not getting overwhelmed by the huge volume of information. Complexity by interaction is characterised by transparency, multiplicity of reference, interfaces, and empathy across a large number of stakeholders and active participants.

Focusing on the patterns of complexity implies that aspects involving soft and hard (descriptive and perceived) characteristics of projects are included in the definition of complexity. The hard characteristics are related to measurable and quantifiable characteristics of the project, while soft characteristics relate to the organisational and behavioural aspects of the project (Bosch-Rekveldt et al., 2011). More important, patterns of complexity capture the unique generic environmental influences on projects in addition to the soft and hard aspects of project complexity. The focus of Geraldi and Adlbrecht's (2007) definition on both soft and hard elements as well on the environmental influences makes it ideal to consider complexity for most project situations because their comprehensive definition captures more complexity attributes.

Although the TOE framework is also eclectic, the framework has more technical components specifically adapted for engineering projects (Bosch-Rekveldt et al., 2011). The conceptualisation of project complexity by Geraldi and Adlbrecht (2007) aligns with other conceptualisations of project complexity. Complexity by fact relates to technological complexity (Luo et al., 2017), structural complexity (Brady & Davies, 2014; Ellinas et al., 2016), scope of work (Bentahar & Ika, 2019; Shishodia et al., 2018), and pace of work (Bentahar & Ika, 2019; Shishodia et al., 2018). Complexity by faith relates to randomness (Williams, 2002), novelty (Bentahar & Ika, 2019; Shishodia et al., 2018;Dvir Sadeh & Malach-Pines, 2006), and technological uncertainty (Ghosh & Bhowmick, 2014). Complexity

by interaction is related to the concept of organisational complexity (Lu et al., 2015) and environmental complexity (Luo et al., 2017). This illustrates that Geraldi and Adlbrecht's (2007) work is more encompassing and expands the views of other researchers on the subject of project complexity.

Therefore, from the various conceptualisations, it appears that Geraldi and Aldbrecht's (2007) definition of project complexity is more appropriate for this study. Thus, project complexity will be defined on the basis of Geraldi and Adlbrecht's (2007) classification of project complexity, because of the complications that are associated with a particular project as a result of the project manager and team dealing with known processes in undertaking the project (complexity by fact), unknown and unforeseeable project related activities (complexity by faith), and interacting with people and organisational structures associated with that project (complexity by interaction). The following discussions on complexity by fact, faith and interaction present thoughts of other authors that relate to Geraldi and Adlbrecht's (2007) conceptualisation of project complexity.

2.2.6 Complexity by Fact

Complexity by fact is similar to structural complexity and deals with handling a huge amount of interdependent data, such as information about the numerous constraints, activities and their interdependencies, and information regarding people related to a project (Müller & Turner, 2007; Brady & Davies, 2014; Ellinas et al., 2016). Team members tend not to have adequate time to evaluate and synthesise all the information available to aid in their decision-making processes (Bentahar & Ika, 2019; Geraldi & Adlbrecht, 2007; Shishodia et al., 2018). The challenge presented by complexity by fact has to do with keeping a holistic and integrated view of the problems in the project rather than focusing on the aspects of factual information available. Complexity by fact can be influenced by size of the project and interdependence of elements of a project (Bentahar & Ika, 2019; Shishodia et al., 2018).

The size of a project has conventionally been perceived as an important part of project complexity (Van den Ende & Van Marrewijk, 2014). Project size can be expressed in terms of the number of components, the number of project activities (project tasks and their interrelationships) and the number of parts associated with a project (Ahonen et al., 2015; Hansen, 2014). Project size may also be represented by the monetary value of a project, the number of people on the project team, including the multiple constituents of a project team or the number of components comprising project design (Ahonen et al., 2015). Project size is determined by the number of structures, stakeholders, deliverables, and departments involved, methods or tools applied, and the broadness of scope and

duration of the project (Hansen, 2014). The size of a project will result in a greater need for coordination and management of the technical and behavioural element of the project, which can result in a greater number of interfaces between the work elements. As a result, Geraldi and Aldbrecht (2007) asserted that project size is a characteristic of complexity by fact because project size requires team members to deal with and integrate a huge number of interdependent sets of information. Owing to limited constraints of time, team members are not able to adequately collect, analyse and internalise information to make decisions. Keeping a holistic view of a project without being lost in the enormous number of details as a result of the size of the project usually becomes challenging.

Interdependence and interrelationship refer to how the various elements of the project are linked and interconnected. Project interdependencies and interrelations can exist within the project and outside. Project interdependency exists when one project is partially or wholly influenced by another project or organisation for its development. Project interdependency also exists within a project when each element depends and influences the other within the same project (Špundak, 2014). Interdependencies and interrelations can therefore emanate from shared resources and technologies across multiple projects or components of projects and organisations (Bathallath et al., 2016; Killen, 2017; Luo et al., 2017). Particularly for the complexity by fact, a project becomes more complex when the degree of interdependence or interconnection, whether within or without, becomes higher. The size and degree of interrelationship creates many constraints that impair the timely gathering and analysis of information. In addition, project constraints can create other issues such as difficulty with gathering information.

2.2.7 Complexity by Faith

Complexity by faith is present when creating something unique (which a project does), handling new problems, and dealing with high uncertainty and unforeseen issues that could not be planned for. Novelty is related to complexity by faith because it is characterised by some degree of uncertainty about what it means as well as its requirements (Geraldi & Adlbrecht, 2007). Situations characterised by complexity by faith have a wide range of possibilities with numerous decisions to be made, albeit with fewer guiding principles. Projects characterised by complexity by faith have vague and ambiguous tasks, which cannot be properly executed using off-the-peg solutions with predefined procedures or answers. Thus, the project team will experiment with different approaches and learn by trial, implying that first attempts tend to have to be modified, and the scope will constantly change (Williams, 2002; Geraldi & Adlbrecht, 2007). Circumstances characterised by complexity by faith have a degree of uncertainty and ambiguity because project team members usually have unlimited options to choose from, but they are limited as they do not know whether a chosen outcome will work (Geraldi &

Adlbrecht, 2007). Therefore, complexity by faith can be influenced by novelty and the interaction of ambiguity, dynamism and uncertainty (Bentahar & Ika, 2019; Shishodia et al., 2018).

Uncertainty is the possibility that an unforeseen and unknown incident might happen from project initiation to its end (Smith et al., 2014; Dvir et al., 2006). Uncertainty is related to both the current and future state of the elements constituting a project, their interaction, and the wide range of the impact of the interactions between these elements. Damasiotis and Fitsilis (2019) suggested that uncertainty is related to management challenges as a result of ambiguity and dynamism in project elements. Ambiguity may be due to aspects such as the lack of clarity in relation to project goals, unpredictable behaviours and demands of stakeholders, resource limitation, and task complexity (Remington et al., 2009). Dynamism in a project can emerge from several changes, such as changes in technology (Ghosh & Bhowmick, 2014), changes in stakeholder attributes, positions, relationships between them, changes in project scope, scope creep, new emerging stakeholders or relationships, and changes in ways or strategies to engage stakeholders (Aaltonen & Kujala, 2016). The interactions between dynamism and ambiguity create uncertainty, leading to unintended deviations from plans and modifications that may lead to the rescheduling of work and the reassignment of resources (Pargar et al., 2019). Though various arguments have been put forward in relation to the concept of uncertainty in projects, uncertainty is generally regarded as emanating from the lack of information which creates the potential for a wide range of change (dynamism) with respect to any aspect of a project De Rezende & Blackwell, 2019; Geraldi et al. 2011b; Pinto et al., 2014).

2.2.8 Complexity by Interaction

Complexity by interaction is the third subgroup of complexity. Complexity by interaction is prevalent in interfaces between locations, human beings, activities and organisational structures. Complexity by interaction is often characterised by conflict among stakeholders (Geraldi & Adlbrecht, 2007; Luo et al., 2017). Project stakeholders typically include project team members, project managers, project sponsors, customers, users, and society affected by the project. Because all stakeholders are somewhat affected by the project and are thus interested in the execution and outcomes of the project, they maintain some level of influence on the project (Cleden, 2012). In typical projects, all the different interests and motivations of various stakeholders make the project complex. Stakeholder engagement by the project manager is often difficult to maintain owing to changing stakeholder requirements and unrealistic expectations of clients. The interactions, interconnections, and interfaces with and between the various stakeholders serves as a challenge, since stakeholders usually have diverse interests in a project that, at times, conflict with each other (Lu et al., 2015). Each stakeholder tries to influence the development of the project by pushing for their preferred definitions

of systems, specifications, and user outcomes. Hence, the lack of consensus among the various stakeholders may also be a source of complexity. High complexity by interaction can be depicted, for instance, by a high volume of messages, calls and meetings, which can contribute to misunderstandings. Complexity by interaction is usually caused by lack of transparency and having to manage a variety of information sources. This indicates that when there is clarity of information and project teams act in the best interest of stakeholders, there would be a possible reduction in the difficulties associated with a project (Müller et al., 2011). The personal interaction style of project managers and communication are also seen as key elements of complexity by interaction (Müller et al., 2011).

2.2.9 Project Complexity and Project Success

Damasiotis and Fitsilis (2019) asserted that regardless of project management practices, most projects fail to meet expectations primarily owing to their respective complexities. Luo et al. (2017) investigated the connection between project complexity and success in construction projects. Project complexity was measured by focusing on goal, task, and organisational, technological, environmental and informational complexities. Project success was captured under time, cost, quality, health and safety, environmental performance, participants' satisfaction, user satisfaction and commercial value. The results of the study revealed that project complexity has a negative correlation with project success. Project complexity also correlates with poor unit-cost results (Tatikonda & Rosenthal, 2000), negatively affects project efficiency (Sicotte & Bourgault, 2008), reduces project efficiency and effectiveness (Hanisch & Wald, 2014), and is negatively related to project schedule and budget (Floricel et al., 2016). Project complexity is associated with risks of project failure, delays and cost overruns, which can lead to project failure (Bjorvatn & Wald, 2018; Bosch-Rekveldt et al., 2011). Project complexity, therefore, places more strain and demands on the skills, knowledge and interrelationships of project managers and their teams, and thus limiting their ability to meet the success requirements of projects, such as completing within a specified time, staying within the stipulated budget, and meeting client expectations (Bjorvatn & Wald, 2018). Complexities must thus be well managed to ensure project success (Bjorvatn & Wald, 2018; Dao et al., 2016).

Antoniadis et al. (2011) examined the effects of socio-organo complexity on project performance. Socio-organo complexity is explained as the complexity of interconnections, particularly those created by social lines and boundaries between diverse team members and stakeholders on the project. Their study indicates that socio-organo complexity reduces project success, particularly project schedule. This socio-organo complexity is similar to complexity by interaction (Geraldi & Adlbrecht, 2007), which is the complexity comprising the management of team members and changes in the organisational

setting. The elements of project complexity in Luo et al.'s (2017) study relates to Geraldi and Adlbrecht's (2007) conceptualisation of the dimensions of project complexity. Goals, tasks and technologies relate to Geraldi and Adlbrecht's complexity by fact, while organisational, environmental, and informational complexities are related to complexity by interaction.

Muller et al. (2012) examined the relationship between leadership competencies, project complexity, and project success. Leadership competencies were measured as emotional, intellectual, and managerial competencies. Project success was measured using the 'iron triangle' (time, cost, and quality), team satisfaction, and customer satisfaction. Project complexity was captured under complexities by fact, faith and interaction. The results of the study by Muller et al. (2012) revealed that complexity by fact and complexity by interaction have a negative connection to project success, while complexity by faith has no significant relationship with project success.

Recent studies in Iran and China also found significant relationships between project complexity and project success in various industries. Ali et al. (2020) conducted a study among employees working on mega construction projects and discovered that all three dimensions of project complexity (fact, faith and interaction) had significant negative relationships with project success. They explained that this phenomenon was due to the fact that mega projects are usually characterised by highly complex technology and attract considerable attention with regard to cost, quality requirements, and the interactional effect between different internal and external factors. Hence, project managers find it difficult to effectively handle the complexities associated with all these factors. Lu et al. (2020) examined the complexity of joint projects on project success in China. They found that complexity factors such as bias and ineffective management, lack of communication, understanding and mutual trust, policy, management style, organisational cultural differences, and possible clashes beyond the joint project partnership remain the top three factors that affect project complexity. A similar study was conducted in Iran by Abbas and Erzaij (2020), sampling engineers in construction sites, academia, engineering management experts and technicians directly related to construction projects. Their results showed that project complexity has an inverse effect on project success. The results revealed that interdependencies between tasks that required different technology and the generation, usage, transmission, and feedback of information were the top complexity factors that influenced project success.

Fugar and Agyakwah-Baah (2010) assessed the most significant factors for delays in building construction projects in Ghana from the perspectives of customers, experts and contractors. According to their study, the ten most significant factors that cause delays are: delays in honouring

payment certificates, underestimation of the cost of the project, underestimation of the complexity of the project, difficulty in accessing bank loans, poor management, shortage of resources, poor professional management, instability of prices due to increasing costs of materials, poor site supervision, and underestimation of project completion time (i.e., complexity by fact and complexity by interaction). The top three contributors to delay were funds, materials, and scheduling and control. These issues were a result of the difficulty in understanding the technical, organisational, and environmental complexities of the construction project. The technical, organisational, and environmental complexities within construction projects cannot be easily predicted, suggesting a level of uncertainty in construction projects (i.e., complexity by faith). According to Fugar and Agyakwah-Baah (2010), both consultants and customers noted factors such as unfavourable site conditions and bad weather affected project success. Owing to the unpredictable nature of site conditions and weather and the fact that site conditions and weather cannot be envisaged during the project planning phase, site conditions and weather contribute to construction project uncertainty (i.e., complexity by faith). However, the findings revealed that, relatively, environmental conditions as delay factors were ranked lower than other factors (Fugar & Agyakwah-Baah, 2010). Similarly, Ansah (2011) found that the leading cause of payment delays included complexity issues such as clients' disagreement with the valuation of work and pace of work.

From these studies, it is evident that project complexity and its dimensions (complexity by faith, complexity by fact, and complexity by interaction) have a tendency to inversely influence project success and its dimensions (project efficiency, the effect on the client, effect on the team, direct business and organisational success, and preparation for the future). Based on the preceding discussions, the following hypothesis was developed:

H1a: Project complexity will have an inverse influence on project success.

The subsequent sections (2.2.6.2 to 2.2.6.6) discuss complexity theories and how these relate to project complexity.

2.2.10 Complexity and Project Complexity

2.2.10.1 Definition of Complexity

Complexity theory defines how order and patterns emerge from seemingly disordered systems and how complex behaviours and structures develop out of simple fundamental rules (Weaver, 2007). The prime focus of complexity theory is to assess how systems comprising several factors develop into ordered and predictable behaviours or outcomes. Complexity theorists view projects as being

nonlinear and dynamic, and, as a result, the system (e.g., a project) cannot be comprehended by focusing only on its components (Sackey et al., 2011). Cilliers (2000) proposes that complexity theory has important implications for understanding organisations and organisational systems (e.g., a project). The nature of complexity is determined by interaction among the elements of the system, which makes relationships fundamental to complex systems (Cilliers, 2001). Organisations and projects are open systems, which means that there are exchanges of information and energy, and a stable state is neither desirable nor attainable, which implies that the boundaries of the organisation or the project are not clearly delineated. Attempts at creating such boundaries tend to end up in failure, especially when these boundaries are strictly adhered to. A project as a system organises itself by interacting with the environment and may (or may not) lead to significant changes to the project outcomes (Cilliers, 2001). In this regard, the project cannot be understood or function independently of its context. Owing to the nonlinearity of interaction between elements in a complex system, small causes can elicit large effects (Cilliers, 2000; Rogers et al., 2013). Conversely, large causes can lead to small effects. The magnitude of an outcome is influenced not only by the size of the cause but also by the context and history of the system.

More often than not, the distinction between complexity and complicated projects is blurred, and so these two terms are treated as synonyms (Efatmaneshnik et al., 2012; Kamensky, 2011). It is important to distinguish between complicated and complex projects. The notable difference between complex and complicated projects is that they both lead to different outcomes in projects (Efatmaneshnik et al., 2012). Complicated projects are usually predictable and linear in nature, and the beginning, middle and end can be clearly defined (Kamensky, 2011). The relationship between the project elements, such as technology and stakeholders, can be clearly identified and predicted (Efatmaneshnik et al., 2012). Projects that are typically considered complicated are dependent on organisational structures with clearly defined positions of authority. The management of such projects is based on documentation and specification, with success largely dependent on the execution of a plan or process (Kamensky, 2011). As such, complicated projects may have some complexity by interaction and fact, and these can be dealt with in a planned manner. However, complicated projects are particularly low in complexity by faith. For complex projects, the project conditions, project intricacies, and interdependencies can produce different outcomes based on the interactions between the project elements. Complexity is about the emergence, dynamic, non-linearity and other behaviours prevalent in systems of interrelated elements (Geraldi et al., 2011a)

From the perspective of complexity theory, project complexity typically arises when project teams have to deliver on project objectives and, in the process, have to deal with issues and tensions

surrounding the project as well as challenges with project stakeholders (Ahmadi & Golabchi, 2013). The actions of stakeholders initiate a need for the project team to adapt to its external and internal environment and proactively engage with these stakeholders in order to deliver on the project objectives. The behaviour of the project team cannot be determined or predicted from the behaviour of any one person on the team (Sheffield et al., 2012). Complexity theory suggests that the delivery of project outcomes is unpredictable, and that the success or failure of projects largely relies on the actions and attitudes of individuals associated with the project.

2.2.10.2 Chaos Theory and Project Complexity

Chaos theory, as a theory of complexity, examines how the dynamic structure of systems, such as a project, responds to certain unforeseeable changes (Hasse & Bekker, 2016; Saynisch, 2010). Chaos theory is concerned with the behaviour of certain kinds of dynamic yet unstable systems over time, especially those continually changing and evolving randomly. Snowden and Boone (2007) asserted that complex and chaotic environments are unordered without an obvious prevailing relationship between causes and effect elements. In a complex context, the right course of action cannot be discovered by actively searching for known causal relationships. A complex environment is in constant flux and is more than the sum of its part (Snowden & Boone, 2007). To properly navigate chaotic and complex environments, the focus should be on understanding and appreciating emerging patterns.

Chaos theory is useful to explain or interpret observable, but perplexing, phenomena in projects. A multitude of changes tend to occur in the project system, which managers most often are unable to identify and keep track of (Saynisch, 2010; Sheffield et al., 2012). As a result, project managers are unable to establish the precise influence of these unforeseeable changes on project activities. Although it is not possible to ascertain a project's level of chaos, chaos theory provides guidelines on how to create better strategies to manage the unforeseen or unforeseeable changes that occur due to the chaos and unpredictability of the project system and environment (Hasse & Bekker, 2016; Saynisch, 2010; Sheffield et al., 2012).

Traditional approaches to project management tend to maintain validity when the goal of a project stays stable, and the work required is clear, understandable, and easy to plan linearly. However, there is a growing recognition that traditional methods might not work in projects that are complex and unpredictable (Pollack, 2007). Consequently, complexity theory and chaos theory provide useful perspectives on the dynamic nature of complex projects. The philosophies and concepts of complexity theory can be applied to enhance the understanding of how projects and institutions operate as

systems (Hasse & Bekker, 2016; Saynisch, 2010; Sheffield et al., 2012). A principal point with respect to complexity theory in relation to project management is that a project team is a social network, a social structure of nodes that are linked by some sort of relationship (Hasse & Bekker, 2016). The impact of the incentives that are available within this social network have more ramifications for the achievement of the project than conventional project controls. Therefore, chaos theory must be seen as complementing project complexity in order to obtain insight into different perspectives concerning how projects and institutions operate and behave as unpredictable systems (Rose & Greg, 2009; Sheffield et al., 2012).

2.2.10.3 Sense-Making Theory and Project Complexity

Sense-making theory describes the process by which individuals and organisations make meaning of their environment and events to obtain deeper understanding. Sense-making refers to a social exchange through which people and organisations understand, interpret, and in a conscious manner and psychologically construct accounts of events to help them to comprehend these events and their environments (Brown et al., 2015; Weick et al., 2005). Sense making serves as a framework for explaining how individuals or groups make meaning out of new and emergent situations they encounter. Sense-making is a social procedure, which is greatly affected by individual differences in thoughts, feelings, and behaviours (Heath & Porter, 2019). Sense-making can, therefore, be considered as the way through which individuals uniquely create meaning out of their experiences. Sense-making theory thus provides insight into how project leadership creates meaning from the complexity in projects.

The sense-making theory was formulated on seven sense-making properties: (i) identity construction, (ii) retrospective, (iii) enactive of sensible environments, (iv) social property, (v) ongoing, (vi) focused on and by extracted cues, and (vii) plausibility rather than accuracy (Heath & Porter, 2019). The various properties are briefly explained below:

- Identity construction is associated with how an individual's sense of self influences their understanding of a situation. The interpretation of a situation is based on an individual's unique senses, self-identity and the perception of the consequences of the situation (Van der Hoorn & Whitty, 2017). Identity construction thus relates to the assumed identity of the project leader, project team, and other stakeholders of the project.
- Retrospection is associated with the construction of meaning based on prior experiences. Sense-making, therefore, is influenced by memory and recollection of a situation (Alderman et al., 2005; Van der Hoorn & Whitty, 2017). Retrospection relates to how the project leader’s,

project team's and other stakeholders' actions and behaviour are influenced by previous experiences.

- Enaction of sensible environments highlights the significance of action in the sense-making process. The 'enactive of sensible environment' assumes that individuals are active beings and, through their actions, contribute to the situation they are making sense of. Sense-making is therefore characterised by reciprocity, whereby the environment affects individuals (Brown et al., 2015). Enaction also relates to how the project leader's, project team's and other stakeholders' actions and behaviour are influenced by previous experiences.
- The social property elucidates the influences of the presence of others in the sense-making process. According to the social property of sense-making, individuals are aware that their interpretation of a situation will be evaluated by others. Social property specifically relates to complexity by interaction between stakeholders.
- The ongoing property of sense-making emphasises the continuous changes in the world and the subsequent need for individuals to make sense of these changes. According to Weick (1993), "The basic idea of sense-making is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs" (p. 635). The ongoing property thus relates to making sense in a high complexity by faith situation.
- The sixth property of sense-making, focused on and by extracted cues, underlines the individual's filtering of cues from the totality of their experience. At the initial stages of sense-making, the situation, according to Chia (2000), has to be "forcibly carved out of the various flux of raw experience and conceptually fixed and labelled so that they can become the common currency for communication exchange" (p. 517). The focusing on and extraction of cues thus relates to how project leaders try to make sense in a high-complexity environment but linking the events to previous understandings.
- Lastly, the property of plausibility, rather than accuracy, emphasises sense-making as an ongoing process which is not about ascertaining truths or getting it right. Instead, sense-making is about making a reasonably plausible and sufficient interpretation, which is not necessarily complete and accurate (Alderman et al., 2005; Van der Hoorn & Whitty, 2017). Plausibility helps project leaders to make acceptable decisions in a highly complex project environment.

The sense-making process leads to the reduction of confusion and the creation of coherence in a complex environment of multiple realities (Weick, 2005). The outcome of sense-making, thus, results in the assembly of a "bigger picture or pattern" of a given situation that aids in interpreting a situation

(Van der Hoorn & Whitty, 2017, p. 48). The significance of sense-making lies in the fact that it empowers people to act when the world they know changes constantly (Sutcliffe, 2013).

In a world where actions are regarded as a priority, sense-making offers an antecedent to more effective action and control of anxiety (De Klerk, 2012; Shannahan et al., 2013). Sense-making is not about obtaining the correct answer; rather, it is the creation of a developing image that becomes more understandable through data gathering, action, experience, and interaction (Heath & Porter, 2019; Sutcliffe, 2013; Weick et al., 2005). Sutcliffe (2013) asserted that sense-making goes beyond interpretations and creates an active system and framework for improved understanding of situations. As a process of socially constructing and retrospectively developing plausible meanings for an uncertain situation, sense-making creates a rational approach for understanding complex situations and making decisions (Weick et al., 2005). Although sense-making has its foundation in cognitive and social psychology, sense-making recognises organisations not as entities with fixed objectives, organisational charts, and management hierarchies, but as fluid entities with multifaceted representations of realities. Sense-making offers a process by which meanings are constructed and deconstructed through dialogue, as well as an avenue by which the social world is produced (Alderman et al., 2005; Brunet & Forgues, 2019; Fellows & Liu, 2017).

Sense-making has been utilised in studies on uncertainty, which found that sense-making can be used to examine and respond to uncertainty (Alderman et al., 2005; Fellows & Liu, 2017; Van der Hoorn & Whitty, 2017). These studies reported that dialogues should be encouraged to make sense in a complex project environment if projects are going to be delivered successfully. In encouraging dialogues, project management will require that project managers focus on promoting teamwork among project teams, actively engaging relevant stakeholders and being transparent with project deliverables (Alderman et al., 2005; Fellows & Liu, 2017; Van der Hoorn & Whitty, 2017).

Project complexity is characterised by uncertainty and ambiguity, and numerous possibilities, which renders predetermined procedures inadequate. When novelty, uncertainty, and ambiguity are encountered, coupled with diverse stakeholders' characteristics, the need to make sense of the project to serve as a basis for action is created (Alderman et al., 2005; Fellows & Liu, 2017; Stingl & Geraldi, 2017; Van der Hoorn & Whitty, 2017). Sense-making is a solution to resolve both ambiguity and uncertainty in the project and is, at the same time, a distinguishing factor. Uncertainty arises when there is a lack of information to support a decision, whereas ambiguity emanates from the abundance of possible interpretations in relation to the information. Both ambiguity and uncertainty are project

realities that might be contrary to the ideal state of situations, and which require substantial sense-making from involved parties.

2.2.10.4 Structuration Theory and Project Complexity

Structuration theory considers structure as sets of symbolic and normative rules, which restrict and enable action as they are enacted, transformed, and repeated by actors in social contexts (Floricel et al., 2014; Whittington, 2010). Structures of social systems such as norms, symbols, and physical objects facilitate social practices. These structures are reproduced by actors (individuals, team members, and organisations) and can, hence, be seen as products of social practices. Structuration theory explains social behaviours by studying the processes that take place at the interface between the actor and the structure (McPhee & Canary, 2016). According to the structuration theory, social behaviour cannot be fully comprehended through structure because social structures have no inherent stability within human action (Floricel et al., 2014; Giddens, 1979). Structuration theory describes the recursive and dynamic interaction between action and structure (Floricel et al., 2014). Structuration theory accentuates the recurrent reproduction of social structures through actions that are consistently repeated (Giddens, 1984; McCann, 2017).

According to structuration theory, actors are considered to be agents who possess power and knowledge and use structural aspects such as rules and resources when interacting. In doing so, actors have an influence on the continuous flow of events (McPhee & Canary, 2016; Whittington, 2010). Structuration theory emphasises the propensity for actors to act in a habitual manner and to reflectively judge, decide, and solve problems (Broady-Preston, 2009; McCann, 2017). Individuals function within the context of rules created by social structures, which are only reinforced when individuals act in a compliant manner (Ferdoush, 2020).

According to structuration theory, any organisation, such as a project, is regarded as a network of social relations, which is constructed through the negotiation of meaning, roles, and interaction norms (Broady-Preston, 2009; McCann, 2017). Social systems such as projects and their social contexts are created by social practices that consist of regularised activities in which actors use and produce normative rules. When structuration theory is applied to the project context, the challenges posed by project complexity consist of two main components. These are the individual actors and social systems. The individual actor consists of the individual component, while the social system refers to the structures put in place by the organisation (Giddens, 1984). For an organisation to be able to disseminate and process information, it needs well-structured communication systems and channels

(Hinojosa et al., 2017). Team members are considered as both powerful and knowledgeable agents who utilise rules and resources and, in this regard, influence the flow of various actions. Therefore, when confronted with making a decision, members of the organisation depend on structure, rules, and resources to enable them to handle the task and arrive at a decision (Ferdoush, 2020; McPhee & Canary, 2016). Examples of these structures include holding meetings and forums to discuss pressing issues. However, the structure may also become a challenge to actions. For example, holding meetings to discuss issues may be constrained by time and limited participation. As a result, these characteristics of the structure may limit actions (McPhee & Canary, 2016). Structuration theory thus helps to understand the complexity by interaction between different stakeholders and their respective interfaces in projects.

2.2.10.5 Social Identity Theory and Project Complexity

Social identity theory postulates that people identify themselves according to the different groups that they feel they belong to or associate with (Trepte & Loy, 2017). Hogg and Cooper (2003) posited that social identity refers to an individual's knowledge or feeling that they are part of a social class or group. A social group is a group of people who have a common social identification or perception of themselves, such as members of the same social class or same profession (Stets & Burke, 2000). Turner and Tajfel (1986) posited a difference between individual and social identity, which they contended support the difference between interpersonal circumstances (where conduct is mostly influenced by personal and biological factors) and group circumstances (which is mainly dependent on class-based processes). Social identity theory explains how individuals utilise social classification and comparison to develop and express their social identity and how they pursue such identity (Scheepers & Ellemers, 2019). For individuals to fully see themselves as part of a social group, the following processes are initiated: social categorisation (individuals are defined and comprehended as people as well as being part of particular social classes), and social comparison (they assess their in-group overall terms or values and compare with out-groups), which result in positive distinctiveness (views that favour the in-group over the out-group), and social identity (the self-perception that is determined by social categories) (Trepte & Loy, 2017). Social identity theory can aid in understanding the thoughts, emotions and behaviours of different stakeholders who work in or with groups, organisations, and projects (Scheepers & Ellemers, 2019).

Organisational identity can be considered as an organisation's members' collective understanding of the features presumed to be central and relatively permanent, which distinguish the organisation from other organisations (Sergeeva, 2017). Identities are made up of "macro-level categories,

temporary and interactionally specific stances, and cultural positions; identities may be linguistically indexed through labels or linguistic structures and systems" (Sergeeva, 2017, p. 16). The construction of identity is shaped by historical structural changes, government reforms, policies, and regulations. Based on this reasoning, identities within temporary organisations, such as projects, can also be viewed as socially constructed by practitioners, stakeholders, and policy makers (Havermans et al., 2019; Sergeeva, 2017). These identities may be more enduring and permanent because, when there is interaction among project teams, there is social categorisation and comparison to achieve some form of social identity (Chiniara & Bentein, 2016; Trepte & Loy, 2017). When team members identify with their respective groups, members of each group tend to conform with the norms associated with the group to which they belong. Creating a social group provides an avenue for information exchange among group members, which fosters conformity (Chiniara & Bentein, 2016; Trepte & Loy, 2017) among project teams and reduces complexity by interaction. Social identity theory helps to clarify the complexity of the identity, requirements, and needs of different groups of stakeholders and their respective interfaces in projects.

2.2.10.6 Social Capital Theory and Project Complexity

Early scholars of the social capital theory, such as Bourdieu (1986), distinguished between three forms of capital: cultural, social, and economic. Social capital refers to the set of psychological and interactional resources that are present in the social relationships between individuals (Di Vincenzo & Mascia, 2012; Nahapiet & Ghoshal, 1998). The central idea of social capital theory is that some social relationships or structured patterns of relationships can act as a means of obtaining important and productive resources (Bartsch et al., 2013; Nahapiet & Ghoshal, 1998). Actors (individuals, team members, and organisations) obtain psychological resources (social capital) through social interaction and connections in a network and further utilise them to advance their goals. Social capital theory suggests that actors can deliberately obtain greater access to important psychological relationships and resources by developing and strengthening relational connections and by managing their connections with others (Amoako-Gyampah et al., 2018). According to Coleman (1988), the consideration of organisational social capital as a resource is a means of including social structure in the relational action paradigm. Scholars who have contributed to the development of the theory agree that social capital creates a social structure that provides a competitive advantage to some individuals or groups when pursuing their goals (Amoako-Gyampah et al., 2018; Bourdieu, 1986; Coleman, 1988). Social capital is obtained from network relationships and constitutes a valuable resource that is inherently socially complex and path-dependent, which can affect performance. In addition, social capital improves both the actor and the network in which the actor is embedded.

Social capital is embedded in the relationships between actors and reflects the nature of relationships within the organisation. The benefits (psychological resources) available within these networks can be intellectual capital, knowledge, social capital, and human capital (Bartsch et al., 2013; Bourdieu, 1986; Di Vincenzo & Mascia, 2012). Nahapiet and Ghoshal (1998) proposed three dimensions of social capital: cognitive, relational, and structural. The cognitive dimension of social capital refers to the resources that provide shared representations, interpretations, and systems of meaning in the form of shared norms and codes among actors in a network (Amoako-Gyampah et al., 2018; Nahapiet & Ghoshal, 1998). The relational dimension underscores the interpersonal relationships between actors in the network, which grows based on a history of interactions. This dimension of social capital focuses on trust and friendship that is established through personal interactions. The structural dimension of the social capital theory alludes to the connections and relationships involving actors in a network (Amoako-Gyampah et al., 2018; Nahapiet & Ghoshal, 1998). This aspect of social capital is considered as the centrality and structural holes of the network (Lee & Kim, 2011). The structural dimension primarily pertains to social interaction typically assessed using network ties between individual project-based organisations such as engineering, advertising, and construction.

As an organisation, the project environment consists of a host of actors in the form of project stakeholders brought together to interact to achieve project goals. Within the project environment, there is a myriad of challenges that often threaten the fulfilment of project goals. Organisational learning is a key driver of performance in projects because it offers potential valuable knowledge that can be utilised in dealing with challenges in the project environment (Bartsch et al., 2013; Zhang & Cheng, 2015). Moreover, it is a major challenge for project-based organisations to learn across project boundaries by making project-level knowledge available to the organisation. Project teams' social capital is conducive to overcoming barriers to learning in projects (Lee et al., 2015; Wen et al., 2018).

Owing to their complex and knowledge-intensive nature, construction projects require much social capital for the effective collaboration between business and other contributors. In this regard, social capital theory may provide a valuable framework and insight into explaining knowledge-sharing behaviour in project contexts (Bartsch et al., 2013; Di Vincenzo & Mascia, 2012). Tasks and activities carried out at the project level are based on heterogeneous and often complex sets of knowledge, information, and social capital. Advancement in innovative behaviours often depends on the consistent combination and sharing of explicit and tacit knowledge that allow project actors to acquire and learn from the experiential knowledge and new techniques and methods developed by their colleagues and other stakeholders (Amoako-Gyampah et al., 2018; Lee et al., 2015; Moore et al., 2018). Under these circumstances, relationships with other projects and the organisation are likely to

provide access to a valuable set of tangible and intangible resources, which may be important for project performance. Within temporary organisations, project teams represent groups of people aiming to achieve well-specified objectives, in which members are aggregated to put together individuals and their resources. Among such resources, social capital available through individual members' social relations appears to be of critical importance, given the work performance and work processes at the project level (Amoako-Gyampah et al., 2018; Bartsch et al., 2013; Di Vincenzo & Mascia, 2012; Lee et al., 2015; Moore et al., 2018)

2.3 Project Success and Complexity in the Construction Industry of Emerging Economies

The construction industry is regarded as complex, and dealing with such complexities continues to be a major challenge for most projects (Kermanshachi & Safapour, 2019; Wibowo, 2009). Project complexity is generally known to adversely affect project performance and success (Bakhshi et al., 2016; Chapman, 2016). This is because complexity causes uncertainty and threats that potentially lead to unintended expenses, increase in project duration that significantly influences project success, and performance when awareness of complexity is absent at the inception of a project (Nguyen et al., 2019).

Complexity in construction projects has increased owing to factors such as funding challenges, technical concerns, and environmental and regulatory concerns (Nguyen et al., 2019). These aspects are prevalent in the construction industry, which is characterised by the involvement of numerous stakeholders with various interests from initiation to project completion (Durdyev & Hosseini, 2019). Construction projects require accomplished knowledge of performing tasks, such as planning, scheduling, and controlling of cost and quality (Sears et al., 2008). The construction industry requires not only accomplished knowledge of technical processes and tools, but also the ability to be innovative, creative and adapt quickly to changing trends, which increases uncertainty and ambiguity (Dulaimi et al., 2005; Farrell & Gale, 2000). The need to be innovative and creative increases the complexity of developing or working with new ideas, methods, trends, and processes. Construction workers need to have good interpersonal and communication skills in order to collaborate with other team members (Sears et al., 2008). This comes with numerous interactional challenges and complexities with regard to team harmony, coherence, and communication and increases complexities associated with interactions.

Bertelsen (2003) suggests that the complexity in the construction project industry should be viewed from three perspectives. First, the project itself is a combination of different elements that are usually complex in terms of project elements and components, parallel and dynamic, and therefore, more

difficult than conventional project management. There is the assumption that all materials and resources such as equipment and labour are readily available for use, which is often not the case. These aspects and complexities are only a few examples of complexity by faith. The construction industry is divided, and various organisations in the industry work together in ever-changing patterns (Mukuka et al., 2015). On a practical level, projects are divided into different parts and are subcontracted to different firms, and these projects are nearly always given to firms with the lowest bidding prices (Qazi et al., 2016). The construction industry is made up of individual operators who are trying to earn reasonable incomes from their low bids. This can be done solely through optimum resource usage (Durdyev & Hosseini, 2019). Thirdly, most construction firms hire external workers who are not permanent staff to work on some aspects of projects (Pinto et al., 2011). These temporary workers are often not well experienced or have divided attention as they may be working on two or more projects at the same time, especially in emerging economies (Eja & Ramegowda, 2020). These complexities provide examples of complexity by interaction. The lack of project management knowledge of construction workers in emerging economies tend to affect such workers capacity to correctly interpretate of complex data (Narayanan & Huemann, 2021; Maseko, 2017). The lack of capacity of construction workers in emerging economies means that project managers and teams develop inaccurate project management plans, especially when dealing with complex projects. This has implications for project tasks and associated cost estimates (Eja & Ramegowda, 2020). These situations provide some indications of complexities by fact.

Research has identified a strong link between project complexity and project success. (Hanisch & Wald, 2014; Luo et al., 2017; Tatikonda & Rosenthal, 2000). Though there are general factors that are considered complex in project management and execution, some of the factors vary from region to region (Mohseni et al., 2019; Dao et al., 2017). For instance, Bjorvatn and Wald (2018) asserted that there are unique factors that are peculiar to the project management in developing and developed countries and this affects projects in different ways. In a study conducted in Pakistan, it was revealed that factors such as “law and order issues, energy crisis, political instability, land issues, and weak authorisation” of project managers are some of the factors that make projects complex and lead to failed projects (Khattak & Mustafa (2019, p. 1366). Another study in Pakistan by Lukhele et al. (2021) on project complexity confirmed that factors, such as bad laws, political will, and delay by government in releasing of funds, adversely affect project success. These elements characterise projects of most emerging economies, which influence the outcomes of complex projects. Some scholars have indicated that in emerging economies there is still more to do in terms of ensuring the effective management of complex projects to achieve project success (Hu et al., 2021).

In research conducted by He et al. (2019), it was revealed that innovation and social responsibility has a positive effect on project success. Research has indicated that complex projects require a high level of innovation to succeed (Puddicombe, 2012). Most complex projects in the developed world achieve success because of the high level of innovation brought to bear from project initiation through to execution. In contrast, in most emerging economies projects fail owing to the low level of innovation applied in complex projects (He et al., 2019). Innovation is now considered as an essential factor in ensuring project success (Ruoslahti, 2020). For emerging economies to improve on project outcomes, attention must be paid to five aspects of project complexity, being technological complexity (requires some innovation), organisational complexity, goal complexity, environmental complexity, and cultural complexity (Ma & Fu, 2020).

Research has further found that, in emerging economies, contractual flexibility has a significant relationship with project success (Wu et al., 2018). It has been argued that, in complex projects, clarification of roles and responsibilities of contracting parties is particularly critical for project success (Demirel et al., 2017; Luo et al., 2020). This is because when the parties fail to clarify roles, this may lead to conflict situations that can have a negative impact on project success.

Hu, Wu, Zhao, Zuo and Wen, (2021), whose study focused on the influence of contractual strength of ties on relationship quality in Chinese megaprojects, found that contractual flexibilities may influence the quality of relationships both positively and negatively in complex projects. Their study revealed that strong relationships with stakeholders tend to have a positive impact on contractual flexibility which has further significant positive effects on project success. However, weak stakeholder relationships tend to have a negative impact on contractual flexibility, and this subsequently has a significant negative effect on project success. These results emphasise that healthy relationships with and among stakeholders go a long way to ensure project success.

Podgórska and Pichlak (2019) found that complex projects in Poland require competent project leaders who are committed and equipped with effective communication strategies to deal with complex situations in different circumstances. They found that project leaders with high commitment and effective communication skills are more likely to achieve success in a complex project. Leaders with effective communication skills promote a good understanding of project requirements and this has the propensity to enhance outcomes of complex projects (Luo et al., 2017). However, such leaders must also be willing to provide the needed social capital and resources and ensure that there is an effective link between the leadership, project team and project implementation (Qureshi & Kang, 2015; Brooks et al., 2012).

The composite nature of project complexity makes it a threat to project success, as a high level of complexity can reduce a project's likelihood to be successful by affecting its quality, cost and duration (Maqbool et al., 2017). The implication of project failure is the abandonment of the project and dissatisfied owners, investors, and other stakeholders. Project complexity influences the strategies and approaches used in undertaking projects, and it is arduous to precisely evaluate and streamline a project's complexity (Nassar & Hegab, 2006; Patanakul et al., 2016). The project manager's role is therefore integral to the overall success of projects because project success is heavily contingent on the leadership style employed in leading project teams (Ranawat et al., 2018). As noted by the international Project Management Institute (2007):

> To a large extent, project success depends on human behaviour-particularly the behaviour of the team leader. Good leadership skills enable a project manager to harness the energy and capabilities of a project team in such a way that the performance of the team is greater than the sum of its parts. Leadership is widely accepted as the critical factor in determining the ultimate success or failure of a project.

2.4 Project Leadership and Project Success

2.4.1 Leadership in Project Settings

Müller et al., (2011) postulated that an essential way of dealing with project complexity and to ensure project success is for project leaders to understand and deal effectively with the complexities in their projects. The ability of a project leader to adequately assess and address the complex issues associated with a project could enhance understanding of the project and its complexities, enhancing the probability of successful project management and completion (Wood & Gidado, 2008).

Effective project management has become elusive and challenging in today's world owing to the complexity and volatility of the project environment. The effectiveness of project management is further affected and made difficult by the changing attributes of projects and teams, such as changing business relationships, the advent of new technologies, multiple stakeholder influences (Masood & Farooq, 2017; Ogunde et al., 2017; Cristóbal et al., 2019). In the light of these changes in the business environment, happenings require that projects are properly managed, achieving effective management involves a wide range of leadership skills and competencies associated with people management, such as communication, and planning (Irfan et al., 2021; Meng & Boyd, 2017; Ribeiro et al., 2021). The role of the project manager now, more than ever, has become integral to accomplishing project goals and objectives.

The project manager or leader is the individual tasked with providing the leadership to ensure that project objectives and stakeholder expectations are met by influencing the performance of their subordinates and other stakeholders (Ojokuku et al., 2012). The project manager oversees the entire project by demonstrating and using relevant knowledge, and leadership competencies, skills, and abilities to plan the entire project and coordinate the activities of team members to execute the project (Damasiotis & Fitsilis, 2019). Several studies contend that project managers' personal qualities, leadership performance and leadership styles contribute to the accomplishment of various kinds of projects at various stages (Famakin & Abisuga, 2016; Nixon et al., 2012; O'Donnell, 2010; Yang et al., 2011). As such, the project manager's effectiveness is critical in accomplishing project objectives, and the strong connection between the project manager and project goals makes it easy to comprehend the skills and competencies that are most important in guaranteeing the effectiveness of the project manager.

The project manager's leadership role is of great importance in motivating people and creating an effective working environment in order that the project team may handle greater challenges in the present global economy (Project Management Institute, 2007). In spite of advances in the project management profession, studies have shown that many projects fail, underlining the importance of the project manager's role as a leader.

The project team is a temporary organisation with a defined beginning, scope, resources, and time. Therefore, projects differ from work in the normal organisational environment, because, while projects are focused on a specific set of operations executed in order to achieve a particular objective, the organisational environment is more preoccupied with routine activities geared towards general objectives (De Klerk, 2014). Based on these differences, the project context is set apart from the organisational context, and therefore leadership in the project setting may present distinct challenges to leadership in the broad organisational setting (Imran et al., 2019; Iqbal et al., 2019; Yang et al., 2011). Project leadership differs in certain respects from leadership in traditional organisations because projects are specific – finite activities that produce an observable and measurable result under certain pre-set requirements, usually characterised by volatile environments, the need to achieve project goals within specific timelines and budget, and resource constraints (Podgórska & Pichlak, 2019a). Project leaders, therefore, require specialised leadership skills, knowledge and competencies to be adapted for the project environment and to manage and provide leadership effectively for the unique challenges in the context of the project.

Project leadership can be described as the act of leading a project team and other stakeholders for the successful completion of a project (Iqbal et al., 2019; Yang et al., 2011). Project leadership entails inspiring, guiding and leading a team to attain project goals (Ahmed & Abdullahi, 2017; Nixon et al., 2012). Ng and Walker (2008) maintain that project leadership entails behaviours that build the trust and confidence of the project team and other stakeholders. Cullen and Leavy (2017) indicated that project leaders need socio-behavioural skills, such as effective leadership competencies, and leadership styles and behaviours, rather than technical skills in order to overcome the challenges in project management.

Barber and Tietje (2004, p. 506) asserted that leadership competency represents:

> a cluster of related knowledge, skills and attitudes that affect a major part of one's job (a role or responsibility), correlates with performance on the job, can be measured against well-accepted standards, and can be improved via training and development. (p. 506)

Some competencies expected of a project leader are self-management, critical thinking, communication, interpersonal skills, teamwork orientation, time management, flexibility, adaptability, self-development dimensions, strategic positioning, commitment to quality, managing stakeholders, and care for the community (Afzal et al., 2018; Geoghegan & Dulewicz, 2008).

De Klerk (2014) asserted that leadership styles have the tendency to influence success in the project context. Specifically, transformational leadership is deemed to influence the success of projects that are uncertain, prone to a lot of changes, and last for long periods (Müller & Turner, 2010; Tyssen et al., 2014). Transformational leaders are able to build strong relationships with their teams that span a long period of time, enabling them to deal better with project uncertainties to ensure success (Tyssen et al., 2014). Müller et al. (2011) analysed the connection between a project manager's leadership style and the project type and how a project manager's leadership style affects project success. Their study aimed to show that different leadership styles would probably lead to successful results, depending on the kinds of projects being executed. Using a model that combines intellectual intelligence, emotional intelligence and managerial competence, the results indicate that the project manager's leadership style affects project success and different leadership styles are suitable for diverse types of projects. They found that a transactional leadership style tends to be suited for projects that are short-termed with clear goals and responsibilities, stable environments and specific methods and outcomes (i.e., complicated, but not complex projects) (Muller & Turner, 2010; Tyssen et al., 2014). Transactional leaders can manage projects with limited resources and clearly defined responsibilities for the project team (Podgórska & Pichlak, 2019a).

Data collected from employees working in Pakistan's construction industry by Ali et al. (2020) revealed that humble leadership (which has both transactional and transformational leadership dimensions) was directly and indirectly connected to project success (through psychological empowerment and innovative work behaviours) . The study found that humble leaders possess the ability to mentally empower their subordinates by encouraging and acknowledging their contributions to the firm's goals. They also treat their employees with sympathy, respect and admiration that make employees know that their contribution to the team is meaningful and has an impact on the overall project outcome. Likewise, such leaders value the contributions and suggestions of their employees, which ultimately enhance employees' confidence and self-worth about their tasks. In addition, the delegation of power and receptiveness to feedback demonstrated by such leaders frees their subordinates from bureaucratic limitations and creates a feeling of independence through which they can effectively contribute to the attainment of project goals. Treviño et al. (2003) asserted that ethical leadership can build trust and confidence in the leader through their honesty and morals and encourage such qualities among team members, thus positively influencing project success. The role of ethical leadership in project success has not yet been studied extensively. However, with the evidence of significant corruption in the construction industry, especially in emerging countries, it is reasonable to expect that ethical leadership will influence project outcomes (Ebekozien, 2020; Rizk et al., 2018; Matloob, 2018).

2.4.2 Transformational Leadership and Project Success

Research has confirmed the positive influence that transformational leadership has on project success (Aga et al., 2016; Anantatmula, 2010; Raziq et al., 2018b; Yang et al., 2011). Raziq et al. (2018) argued that transformational leadership characteristics are essential for enhancing the performance of the project team and the behaviour of other stakeholders to ensure project success. Rausch et al. (2005) conceptualised two leadership styles in the project setting: the firelighter (transformational leader) and the firefighter (transactional leader) (management by exception and laissez-faire leader). The firelighter is proactive, visionary and inspirational, while the firefighter is reactive to immediate problems. The authors argued that, in turbulent and complex project environments, a project manager must be a firelighter (transformational) to be effective and succeed. Transformational leadership leads to the transformation of followers and other stakeholders by making them increasingly mindful of the value of results, and encouraging them to rise above their own personal interests for the sake of achieving higher-order needs and goals (Limsila & Ogunlana, 2008; Iqbal et al., 2019). The transformational leader encourages employees to pursue and utilise novel and unique avenues to challenge existing conditions. Transformational leaders boost the enthusiasm, drive, and

performance of stakeholders through different mechanisms. Their actions consist of linking people's sense of identity and personality to the project and the shared identity of the organisation.

As a role model, transformational leaders motivate and challenge project teams and other stakeholders to take greater responsibility for their work (Iqbal et al., 2019). Transformational leaders create changes in the lives of people and the organisation by seeking to make changes at the cultural level within the organisation instead of working with already existing systems (Yazdani & Bashir, 2018). The transformational leaders promote a common vision among all stakeholders and engender a total buy-in which influence the project culture and outcomes (Zaman et al., 2020). Transformational leaders respond to the demands of the environment with support from their stakeholders, who have been influenced to strive for change beyond their individual interests and move towards more collective aspirations (Avolio & Bass, 2001; Stewart, 2006).

Transformational leadership consists of four dimensions, namely idealised influence, inspirational motivation, intellectual stimulation, and individualised consideration (Avolio & Bass, 2001). Idealised influence entail leaders presenting themselves in a manner that instils trust, admiration and appreciation in followers (Naeem & Khanzada, 2017). According to Jaiswal and Dhar (2015), idealised influence is also termed charisma, and it is the degree to which stakeholders admire and trust leaders. Idealised influence refers to a leader's behaviour that stirs up strong emotions from stakeholders and their identification with the leader (Zaman et al., 2019). Leaders who are high in idealised influence demonstrate perseverance and the quest to achieve targets, demonstrate high moral standards, forfeit self-interest for the benefit of others, consider the needs of those under their leadership over their own needs (Limsila & Ogunlana, 2008). The idealised influence dimension of transformational leadership stresses charismatic and exemplary behaviours such as being principled, fair, and moral in all dealings, which followers admire. When transformational leaders exhibit such exemplary ethical behaviours on a project, stakeholders are likely to admire, appreciate and emulate such behaviours. As a result, project team members would be able to execute project activities effectively and diligently in collaboration with other stakeholders by following laid-down principles, goals and procedures to ensure project success (Raziq et al., 2018).

Leaders exhibit inspirational motivation when their actions inspire and encourage stakeholders by giving them a sense of purpose that challenges them to a higher level of aspiration (Bass, 1990). Inspirational motivation involves the communication of the leader's vision in a manner that is engaging and motivating enough for stakeholders to follow and serve as a yardstick for them (Deribe Assefa Aga, 2016b). The transformational leader changes things by communicating with their

followers and other stakeholders on prevalent issues and by providing an attractive vision of the future (Avolio & Bass, 2001; Stewart, 2006). Inspirational motivation alludes to the leader's excitement and positive thinking in accomplishing a dream and stirring similar emotions in stakeholders (Obeidat & Tarhini, 2016). Leaders who inspire all their stakeholders and challenge them inspire positivity in relation to the attainment of future goals (Bacha, 2014). Thus, all respective stakeholders are given a reason to be determined, hopeful and focused.

Individualised consideration is the extent to which a leader gives personal attention to different stakeholders to motivate them. Individualised consideration refers to how the leader relates personally with all stakeholders and the provision of conditions conducive for collaboration and performance (Podgórska & Pichlak, 2019a). It indicates the degree to which leaders show interest in stakeholders' respective needs, and well-being, and pay attention to those who seem less involved in the project and its outcomes. Individualised consideration is made up of the behavioural components of coaching and mentoring, and focuses not only on the greater good of the organisation but also on the specific needs of all stakeholders – which ensures equity rather than equality (Strang, 2005; Aga et al., 2016). Individualised consideration also comprises giving support, encouragement to one's subordinates and other stakeholders (Aga et al., 2016; Raziq et al., 2018). Individualised consideration acts as an antecedent for cultivating a culture of knowledge-sharing, supportive climate and trust within a project. Through individual consideration, the behaviour of the project leader demonstrates acceptance of individuals' and stakeholder groupings' qualities and differences. Individual consideration leads to the creation of a two-way exchange relationship that facilitates and induces participation from stakeholders (Aga et al., 2016; Raziq et al., 2018).

Intellectual stimulation is the frequency with which leaders encourage project members and stakeholders to be innovative in coming up with solutions to problems. Intellectual stimulation shows the degree to which leaders encourage others to be creative in looking at old problems in new ways and in creating an environment that is tolerant (Agyemang et al., 2017). Intellectual stimulation refers to leaders' ability to encourage others to think out of the box when dealing with problems which result in creativity and innovation. Intellectual stimulation encompasses leadership behaviours that increase stakeholders' interest and awareness of problems and that increase their tendency to think about problems in novel ways (Agyemang et al., 2017). The effects of intellectual stimulation are evident in increases in stakeholders' ability to conceptualise, comprehend and analyse situations and in a general improvement in the quality of solutions presented. Moreover, intellectual stimulation is about the leader encouraging others to bring up more imaginative and innovative ideas by addressing suppositions, improving issues, and looking at old issues in new ways (Erkutlu, 2008). It encourages

others to challenge the status quo, which in turn brings about efficient and effective ways of doing things (Prasad & Junni, 2016).

Aga et al. (2016) found a positive relationship between a project manager's transformational leadership style and project success. These authors posited that transformational leadership is favourable for the implementation of team-building efforts, which drastically contribute to positive project results. Oh et al. (2019) found that transformational leadership influences project success directly. Iqbal et al. (2019) showed that project managers who demonstrate transformational leadership behaviours significantly enhance project success.

Ng and Walker (2008) stressed the need for project leadership behaviours that build the trust and confidence of the project team. Several other studies (Hassan et al., 2017a; Maqbool et al., 2017a; Prabhakar, 2005; Tyssen et al., 2014) found that transformational leadership correlates with project success. Research on leadership in projects indicates that transformational leadership inspires project participants and stakeholders to be more innovative, solve problems, collaborate, and go the extra mile in delivering a project successfully (Kissi et al., 2013; Sohmen, 2013). Gumusluoglu and Ilsev (2009) assert that the intellectual stimulation dimension of transformational leadership encourages project participants to explore ideas while the vision articulation dimension promotes the generation of new ideas, enhancing the success of the project. Furthermore, the dimensions of idealised influence and inspirational motivation enhance team members' commitment, autonomy, and freedom, and make them feel important as key drivers of project success. Project team members are, therefore, driven by these feelings to work to their fullest potential towards successful completion and functioning of the project (Raziq et al., 2018c).

In a study of 117 construction firms, Maqbool et al. (2017) found those project managers who have high emotional intelligence and demonstrate transformational leadership are effective leaders and achieve more project success. Similarly, Hassan et al. (2017) found that project managers who exhibited transformational leadership influenced projects better than their counterparts who do not. Transformational leaders communicate their vision, motivate their followers, support collaborations and knowledge sharing, and create an environment for risk-taking that helps the project teams to deal with highly turbulent and uncertain environments (Tyssen et al., 2014).

Lasrado (2020) found that transformational leadership is important in creating a culture that enables project success. Their results showed that transformational leaders achieved better performance and promoted employee adaptability by encouraging their followers to focus on goals and deliverables.

Doan et al. (2020) found that relationship-building, context creation, visionary direction, inspiration, and support, i.e., transformational leadership, help project teams and stakeholders to maintain focus in the process of change and rapid integration during mergers and acquisition projects. Transformational leaders have been found to significantly influence stakeholder behaviour, attitude, and work performance on projects (Para-González et al., 2018). Workers are motivated by transformational leaders – which in the long run leads to positive change in worker attitudes, beliefs and values in respect of firms. Para-González et al. (2018) contended that transformational leader support enhances task performance, staff satisfaction, and project success. Yizhong et al., (2019) further found that transformational leaders are able to create harmony among team members.

Famakin and Abisuga (2016) found that transformational leadership positively affects the success of projects. They assert that a supportive leader influences the affective commitment of teams, and the consistent commitment of the staff is influenced by supportive and goal-oriented leadership styles. The preceding discussions indicate that transformational leadership is likely to influence the success of a project (Strang, 2005; Thamhain, 1999). Results from the studies discussed suggest that transformational leadership influences project success and its dimensions (project efficiency, effect on the client, effect on the team, direct business and organisational success, and preparation for the future) positively. From these discussions, the following hypothesis was developed:

H2: *Transformational leadership will positively influence project success.*

2.4.3 Transactional Leadership and Project Success

In contrast with transformational leaders, transactional leaders concentrate on tasks and the use of exchanges and bargains to influence followers towards goal and objective achievement (Trivellas & Drimoussis, 2013). Transactional leadership is about exchanges between leaders and their subjects, where leaders specify and offer rewards in return for subordinates' performance (Bass et al., 2003). Transactional leaders typically provide incentives to reinforce the desired behaviours from their followers and punish behaviours that are deemed undesirable and below expectations (McCleskey, 2014). In this regard, the transactional leader keenly monitors the output of subordinates and checks for possible deviations and irregularities (Trivellas & Drimoussis, 2013).

Zhang et al. (2018) proposed two forms of transactional leadership: active and passive leadership. They argued that active-transactional leadership consists of expected rewards and management by exception (active). Leaders who employ this type of transactional leadership give extrinsic rewards and corrective actions to motivate their subjects to work harder. Conversely, passive-transactional

leadership consists of contingent punishment and management by exception (passive). Leaders who use this style of transactional leadership attempt to put pressure on their subordinates through punishments to ensure that they work hard to achieve the organisation's expected objectives. Zhang et al. (2018) found that active-transactional leadership tends to have a positive relationship with project success, while passive-transactional leadership tends to have a negative relationship with project success.

According to McCleskey (2014), transactional leaders motivate workers by explaining the goals that staff have to achieve, demonstrating normally accepted procedures to achieve the goals, clarifying avenues for performance valuation, providing input on work outcomes, and offering rewards that are contingent in nature if workers achieve the goals. Transactional leaders indicate the duties of their staff and what they have to do to achieve their goals (Politis, 2002). They are transactional in focusing on clarifying tasks and meting out punishment for poor performance and rewards for great performance (McCleskey, 2014). Employees are rewarded by transactional leaders when they meet specific and explicated expectations (Bass & Avolio, 1994; Northouse, 2007).

With regard to active management by exception, team members are assumed to know that their activities and performance on a project are being actively monitored and, therefore, will exert optimum effort and caution in executing their duties, hence enhancing the effectiveness of their work and ensuring project success (Raziq et al., 2018).

Within the project environment, transactional leadership have been found to influence project success (Liphadzi et al., 2015; Raziq et al., 2018a; Yang et al., 2011). For instance, Tyssen et al. (2014) found that a transactional leadership style could influence team members' attitudes towards project success. However, Tyssen et al. (2014) argued that transactional leadership tends to be effective only in simple projects that are short-term, have clear goals, and responsibilities are plainly defined and known by all. In the project setting, the transactional leader's primary focus is towards the project tasks to be executed by project teams and the expected work outcomes, with little attention to relationships and stakeholder needs and expectations. The behaviour of the transactional leader therefore resembles that of an administrative manager, rather than a visionary leader and often cannot be sustained for longer periods. In contrast, construction projects which span longer periods are often characterised by constant changes which require that project leaders are more supportive of project teams in executing project tasks. In this regard the effectiveness of transactional leadership may not be realised and therefore may not have a significant effect on project outcomes. From these discussions, the following hypothesis was developed:

H3: *Transactional leadership will not positively influence project success.*

2.4.4 Ethical Leadership and Project Success

In most sub-Saharan African nations and emerging economies, ethics is a sensitive but critical issue, considering the vast prevalence of corruption in construction projects (Pring & Vrushi, 2019; Sulemana & Kpienbaareh, 2018). Surveys by Transparency International have shown that construction is the sector most prone to corruption in both developed and developing economies, leading to highly increased costs of projects and eventual project failure (Ebekozien, 2020; Rizk et al., 2018). Matloob (2018) found that ethical leadership influences project success as ethical leaders can rekindle and support the moral attitude of employees to contribute effectively and efficiently to the success of projects. Ethical leadership of project teams leads to enhanced production and distribution processes, rise in staff capability and satisfaction, and consequently, project success (Lee, 2009). These discussions accentuate the need for ethical leadership in construction projects, especially in emerging economies.

Ethics and morality pertain to what should be done and how human beings should behave as members of a group or society. Ethics and morality are about distinguishing between right and wrong or good and evil (Dang et al., 2013; Menapace, 2019). Although ethics and morality are closely related and can mostly be used interchangeably, ethics generally refer to a set of principles that define allowable actions or correct behaviour, while morality refers to guiding assumptions, ideas or opinions of what it means to be good and to be driven by aspirations to be good (Bell et al., 2013; Ciulla, 2013; Dang et al., 2013). Understanding ethics is fundamental to the management of people because the central themes of ethics are the focal issues of leadership, such as personal challenges of authenticity, self-interest, justice, competence, and moral obligation (Ciulla, 2013; Dang et al., 2013).

Brown et al. (2005) defined ethical leadership as the demonstration of conduct for the common good that is acceptable and appropriate in every area of lives and interpersonal relationships, and the promotion of such behaviours to subordinates and others via two-way communication, support, and decision-making. Al-sharafi and Rajiani (2013) asserted that ethical leadership has to do with the standards, convictions and ideals of right/good and wrong/bad, which describe the basis of organisational behaviour, thereby forming the platform upon which leaders influence their staff in realising the targets of the firm. The ethical leader is guided by a set of moral principles and focuses not on fulfilling personal interests, but on the interests of stakeholders and empowers employees for their growth and treats them fairly (Zhu et al., 2004). These definitions suggest that ethical leaders behave appropriately and exhibit traits such as honesty, trustworthiness, and fairness, making them

credible role models. These definitions consistently emphasise the relevance of interpersonal relationships, two-way communication, and rewards to encourage followers to behave ethically (Al-sharafi & Rajiani, 2013; Brown et al., 2005; Zhu et al., 2004).

According to Treviño et al. (2000, 2003), ethical leadership consists of two dimensions: the moral person and the moral manager. The moral person is about the personal traits, character and inspiration of a leader as observed by stakeholders. Thus, ethical leaders are perceived to be "honest and trustworthy, fair and principled decision-makers who care about people and the broader society, and who behave ethically in their personal and professional lives" (Brown & Treviño, 2006, p. 46). The moral manager relates to how leaders influence their supporters or subordinates to act morally (Treviño et al., 2003). As stated by Brown and Trevino (2006), "moral managers make ethics an explicit part of their leadership agenda by communicating an ethics and values message, by visibly and intentionally role modelling ethical behaviour, and by using the reward system to hold followers accountable for ethical conduct" (p. 597). This notion emphasises the social learning perspective that leaders become role models and examples for their subordinates and other stakeholders. Employees and other stakeholders may learn exemplary behaviour from the leader by engaging in those behaviours observed in the leader that are considered acceptable and eschewing those that are not exemplary (Qi & Ming-Xia, 2014).

Ethical leadership is important for organisational growth and development. Particularly, ethical leadership creates an ethical work atmosphere in a project, where leaders act with honesty, and subordinates trust their leaders and feel fulfilled and committed to the tasks they have been assigned, which helps them to thrive in their jobs and enhance their performance in undertaking projects (Matloob, 2018). The ethical leader communicates with stakeholders in relation to appropriate conduct by utilising two-way communication, listening to their thoughts, and asking for their ideas on the course of action (Brown & Treviño, 2006). In other words, ethical leaders set moral standards, reward ethical behaviour and punish people who do not adhere to set standards through "reinforcement". Ethical leaders focus on the moral outcomes of their choices and make ethical choices that can be imitated by their followers (Bass & Avolio, 2000). Ethical behaviour such as honesty and trust is thus also likely to build the trust of other stakeholders in the project leader and the project team.

Ethical leaders are honest and reliable, and therefore, as they engage various stakeholders, their behaviour is likely to result in stakeholder satisfaction and project success. Ng and Walker's (2008) study identified the need for project leadership behaviours that build the trust and confidence of the

project team. Trustworthy and honest behaviours (ethical leadership) can positively influence project success and its dimensions. Ethical leadership has been linked to positive employee outcomes and behaviours (Javed et al., 2017; Xu et al., 2016). It helps employees to identify intrinsic values for work, which could inspire commitment and motivation (Javed et al., 2017). Xu et al. (2016) found that employee trust is founded on ethical leadership. They also found a positive connection between ethical leadership and employee performance, suggesting that when supervisors are ethical leaders, their relationship with employees is strengthened because of trust and perceived fairness.

The relationship between ethical leadership and project success has received limited attention in project management literature. Bhatti and Kiyani (2019) studied the effect of ethical leadership on project success, with trust and knowledge-sharing as mediating factors. Their results indicate that ethical project leadership has a positive influence on project success. The results also suggest top management should ensure project managers' ethical leadership competencies to improve the probability of project success, especially in complicated and difficult conditions. Littman and Littman (2017) studied six ethical leadership strategies for project management success: respect, accountability, fairness, honesty, bravery, and compassion. They found that the success of project management was improved through constructive ethical leadership and integrity of project leaders who set high personal standards in their conduct and in making ethical decisions that are adhered to by everyone. These standards result in trust and robust decision-making to the advantage of all stakeholders, enhancing the opportunity for project success and decreasing the threat of project failure.

Odeneye, Hoon and Phlypo (2018) and Joslin and Müller (2016a) also found significant relationships between ethical leadership and project success. A study on the impact of governance practices on project success found that leaders who exhibit weak moral and ethical behaviours face more challenges in executing projects (Bhatti & Kiyani, 2019). In contrast, leaders who build strong ethical cultures and systems create a conducive environment to achieve project efficiency, stakeholder satisfaction, project impact, and overall organisational benefits (Joslin & Muller, 2016). Odeneye et al. (2018) found that a high perception of the ethical behaviour of project leaders by their subordinates has a positive impact on organisational success in project-oriented organisations. They also found that fairness and honesty, accountability, humility and relationship-building are key features for many employees and other stakeholders – which enhance their relationship with project leaders and their commitment to completing tasks assigned by their leaders.

Ethical leaders provide a positive ethical environment for their workers to offer a clear normative order that aids project team members perform their duties ethically and efficiently (Nejati et al., 2020). Similarly, Saha et al. (2020) considered ethical leadership to be a substantial predictor of firm performance based on a study that sampled project workers in India. The results showed that leaders influence their subordinates by establishing appropriate principles for employees to learn and emulate. In particular, the study found that, owing to the leaders' power and the ability to reward and reprimand, workers pay close attention to and copy their leaders' attitudes. Workers also indulge in actions that are rewarded and stay away from behaviours that are punished in the firm. Trivellas and Drimoussis (2013) indicated that effective project managers have a wide scope of qualities, demonstrating significant levels of behavioural and managerial integrity. From these discussions and although there is no research available on the influence of ethical leadership on project success in emerging countries, the following hypothesis was developed:

H4: *Ethical leadership will positively influence project success.*

2.4.5 Project Leadership Roles

Leadership studies tend to have been overly preoccupied with identifying various traits and personalities associated with effective leadership (De Klerk, 2014). Most leadership studies try to identify certain common behavioural patterns deemed effective in a leadership context. The stereotypical all-powerful, undisputed leader with the ability to control an organisation and influence success or failure continues to dominate leadership studies (De Vries, 2007; Shaari et al., 2015). Some leadership studies have, however, shown that the most successful organisations are not always those with a powerful, charismatic leader (Al-Khaled, 2016; Maseko et al., 2019). Successful organisations are often led by individuals through distributive, collective, and complementary leadership. Effective leadership depends more on matching these natural leadership styles (traits and personality) to particular roles, challenges, and an enabling environment. This is a recognition that a group of carefully selected individuals can be guided and structured into an effective leadership team for an organisation. It was found that effective leaders need to play a variety of roles at different times, in various degrees, depending on the level and function of management and not necessarily based on traits or personalities (Ahmad & Loch, 2019; Al-Khaled, 2016; De Vries, 2007).

Within the project environment, leadership actions and traits that ensure project success cannot be guaranteed because the personalities and needs of leaders, followers and other stakeholders differ. In addition, project contexts may also differ, which may require different managerial and leadership approaches. In some project contexts, project leaders have to be more directive and task-oriented,

while, for other projects, successful project leaders have to be more consultative, participative and relations-oriented. The list of recommended leadership characteristics and traits prescribed tend to be idealistic, overly comprehensive and exhaustive, which makes any attempt to live up to all of them impractical or impossible (De Klerk, 2014; Louw et al., 2021). De Klerk (2014) suggested that a more reasonable alternative to striving for idealistic leadership characteristics would be to focus on essential leadership roles that a project leader needs to fulfil in order to enhance project success. Project roles deal with actions, functions and specific duties that a project leader must fulfil in managing people, situations and resources to enhance effective project leadership and the probability of project success.

Bass (2007) maintains that for leadership to be successful, there are several behaviours between the extremes of task-oriented leadership and people-oriented leadership styles that have to be adopted. Some studies have identified various roles that are expected to be performed by leaders (De Klerk, 2014; De Vries, 2007; Senaratne & Samaraweera, 2015). De Vries (2007) identified the roles that leaders are expected to play, namely strategist, change catalyst, transactor, builder, innovator, processor, coach and communicator to achieve effective leadership. The roles identified by De Vries were not specific to the project environment. Specifically for the project setting, De Klerk (2014) suggested that project leaders could focus on performing seven essential roles in order to lead projects successfully, namely: being a *direction setter* (visionary, inspirational, engaging, focused and loyal); *ethical tone-setter* (exemplary, ethical, moral, genuine and truthful); *energiser and mobiliser* (optimistic, enthusiastic, happy, influential and inspirational); *the catalyst of possibilities* (creative, innovative, dynamic, spontaneous, flexible and reactive); *compassionate anchor* (caring, compassionate, understanding, reliable and helpful); *orchestrating driver* (results-orientated, hardworking and knowledgeable); and *integrator* (good relational skills, good technical skills, intuition, know-how, diagnostic skills and wisdom) (De Klerk, 2014, pp. 76–80).

De Klerk's (2014) conceptualisations of project leadership roles are yet to be empirically examined by other research, although the project roles found by Senaratne and Samaraweera (2015) do overlap with those proposed by De Klerk (2014). Senaratne and Samaraweera (2015) found, among others, that, at the "forming stage", the project leader provides the structure and clear task direction (an orchestrating driver); is actively involved in the project and creates confidence (energiser and mobiliser); and adopts two-way communication (direction setter and integrator). At the "storming stage", the project leader clarifies and explains (orchestrating driver), consults and acknowledges conflicts (integrator), and offers praise and support (compassionate anchor). At the "norming stage", Senaratne and Samaraweera (2015) found that project leaders promote discussions, ask for contributions from all team members, and encourage them in decision-making (direction setter,

energiser and mobiliser), give feedback and support (compassionate anchor), and collaborate and build strong relationships (integrator). At the last "performing stage", project leaders observe and inquire (orchestrating driver), set goals for the team (direction setter) and provide two-way communication (integrator). Table 3 compares the leadership roles and their descriptions as identified by De Klerk (2014) and Senaratne and Samaraweera (2015).

Table 3
Project Leader Roles as Advanced by De Klerk (2014) and Senaratne and Samaraweera (2015)

De Klerk (2014)		Senaratne and Samaraweera (2015)	
Role	**Description**	**Role**	**Description**
Direction setter	A project leader is visionary, inspirational, engaging, focused and loyal.	Direction setter (forming/performing)	A project leader sets goals for the team and adopts two-way communication.
Integrator	A project leader demonstrates good relational skills, good technical skills, intuition, know-how, diagnostic skills, and wisdom.	Integrator (storming/performing)	A project leader consults and acknowledges conflicts, creates strong and collaborative relationships.
Orchestrating driver	A project leader is results-orientated, a hardworking monitor, knowledgeable, and a counsellor.	Orchestrating driver (forming/performing)	A project leader observes and inquires, clarifies and explains, provides structure and clear task directions.
Energiser and mobiliser	A project leader is optimistic, enthusiastic, happy, influential, and inspirational.	Energiser and mobiliser (forming/norming)	A project leader is actively involved and builds confidence
Compassionate anchor	A project leader is caring, understanding, reliable, and helpful.	Compassionate anchor (norming)	A project leader offers praise, feedback, and support.
Ethical tone-setter	A project leader leads by example, is ethical, moral, genuine, and truthful.	Not applicable	Not applicable
Catalyst of possibilities	A project leader is creative, innovative, dynamic, spontaneous, flexible and reactive.	Not applicable	Not applicable

Although there are a few distinctions between the roles found by Senaratne and Samaraweera (2015) and those proposed by De Klerk (2014), major similarities can be drawn. For instance, in context building, there is an adaptation of the project and leadership approach to fit the context (the catalyst of possibilities), as well as the establishment of channels of interactions (integrator). In cultural bridging, there is the leading of multi-cultural teams (direction setter, energiser and mobiliser), as well as mediating and facilitating aspects of foreign culture (integrator). In political brokering, the project leader is largely an integrator who negotiates, builds and maintains agreement among those on the project, and maintains relationships among them.

An attempt to do an all-encompassing conceptualisation of project leadership roles must, therefore, take into consideration all these different sets of roles identified (Zhang et al., 2018). It is, thus, important to amalgamate these identified roles to capture all salient, distinct aspects to enhance understanding and develop a suitable measuring tool for project leadership roles. These project leadership roles are deemed to have positive implications for project success (De Klerk, 2014; De Vries, 2007; Senaratne & Samaraweera, 2015). Project leaders create a vision and guide its pursuit, and they establish an ethical culture through their morally upright behaviours. They create optimism and motivate members; they drive creativity and innovation and encourage empathy and collaboration while coordinating activities on the project and managing good interpersonal and technical skills among team members. These roles tend to enhance the achievement of project goals and drive project success (De Klerk, 2014).

2.4.6 The Moderating Role of Project Leadership

Müller and Jugdev (2012) reasoned that the behaviours, styles and competencies of project leaders are crucial for dealing successfully with complexities inherent in a project. In order to lead and manage a project to achieve success, project managers and leaders must adopt appropriate leadership styles and strategies to effectively control and manage the various project characteristics and connected interfaces that lead to greater project complexity (Dao et al., 2016). Thus, the ability of a project leader to adequately assess and address the complex issues of a project can enhance the understanding of the project, leading to its successful management and project completion (Wood & Gidado, 2008).

Project managers tend to manage project complexity by coordinating, communicating and controlling project activities to ensure project success (San Cristóbal, 2017). San Cristóbal et al. (2018) asserted that the negative influence of complexity on project success can be prevented by understanding and managing project complexity and the elements of a project, as well as the connections between them in the project system. Therefore the project manager is an indispensable factor in managing the complexity and success of a project (Luthans, 2002; Omonyo, 2019).

Transformational, transactional and ethical leadership and project leadership roles are discussed next in order to provide an understanding of the role that these variables might play in moderating the project complexity–project success relationship to promote the probability of project success.

2.4.6.1 Transformational Leadership as a Potential Moderator

According to Dulaimi et al. (2005), project managers and leaders need to demonstrate behaviours associated with transformational leadership such as being supportive and inspiring, and promoting

innovative behaviours to help deal with complexities and enhance the success of the projects. Podgórska and Pichlak (2019b) asserted that transformational leadership characteristics, such as diligence, inspiration, sensitivity, achievement and effective communication, are associated with project success. Herold et al. (2008) posited that transformational leaders provide vision and charisma to guide team members in dealing with complex changes in projects. As projects are change initiatives in themselves (Turner & Müller, 2003), transformational leadership provides vision and guidance to enable team members to cope effectively with any complexities associated with change, such as bringing up novel ideas, which ensure project success (Anantatmula, 2010; Tyssen et al., 2014). Atkinson et al. (2006) found that transformational leaders stimulate subordinates intellectually to meet new project challenges by being innovative, with new ideas and designs to enhance project success. When team members and other stakeholders encounter the complexity by faith, which requires new ideas, methods and procedures, their creative abilities are enhanced by transformational leaders to assist them to deal with this form of complexity (Tyssen et al., 2014). Consequently, transformational leadership enhances the success of the project in terms of efficiency in delivery and its positive impact on the project team, stakeholders and clients (Raziq et al., 2018).

Large construction projects typically have team members and stakeholders with diverse backgrounds, beliefs and values. This sometimes results in conflicts which constitute complexity by interaction (Imran et al., 2019). However, transformational leaders are able to motivate and build a strong team spirit that enables all stakeholders to interact well with one another (Tyssen et al., 2014). Thus, transformational project leaders are likely to be able to deal effectively with any complexities of interaction within the extended project team, improve the efficiency of the project, and ensure stakeholder satisfaction (Shenhar & Holzmann, 2017). Similarly, individualised consideration could provide personal support for all stakeholders, enhancing their commitment and the probability of project success (Shenhar & Holzmann, 2017). Paying special attention to stakeholders' specific needs fosters communication and ensures that they are able to comfortably communicate any challenges or complexities they face and seek adequate solutions to improve project efficiency and overall success (Tyssen et al., 2014). Hassan et al. (2017) demonstrated that transformational leadership serves as a mediating variable for extraversion, geniality and openness to experience, which were found to be indicators of project success. Transformational leaders also inspire individuals to handle the pressure produced by the uncertainty of change and encourage them to sustain performance (Bayraktar & Jiménez, 2020). The behaviours of transformational leaders can therefore provide support for project teams when faced with uncertainty (complexity by faith).

Doan et al. (2020) found that project managers who provide inspirational motivation are more likely to achieve project success by motivating employees to push themselves to achieve project deliverables, even in the face of challenges. Doan et al. (2020) found that managers who exhibit high levels of idealised influence are able to lead project teams to achieve more success with complex projects. Zaman et al. (2020) found that CEOs who are transformational leaders had both a direct and indirect (moderating and mediating) effect on project portfolio success in multicultural projects and with diverse stakeholders. They found that visionary leadership by transformational leaders creates an environment that facilitates innovation and creativity in uncertain times. Transformational leadership was also found to have a moderating impact on project success through the creation and maintenance of high-quality relationships. Transformational leadership encourages learning behaviours such as learning from previous failures of projects (Shi, 2020).

From the discussions presented above, transformational leadership can conceptually be linked to the various dimensions of project complexity. Particularly, the characteristics of individualised consideration and intellectual stimulation can be linked to complexity by faith. Complexity by faith creates a state of uncertainty where routine solutions cannot provide adequate solutions to novel projects. Dealing with project situations that are characterised by complexity by faith requires characteristics that border on innovation and trust. Individualised consideration can engender trust between the leader and project team members. Moreover, intellectual stimulation can encourage project team members to reason beyond convention and to be more innovative. Consequently, it is hypothesised that:

H5: *Transformational leadership will moderate the relationship between project complexity and project success.*

2.4.6.2 Transactional Leadership as a Moderator

Transactional leadership emanates from contingent reinforcement where team members receive motivation from the promises, rewards and recognitions (Northhouse, 2007). Transactional leadership often seeks to inspire team members by appealing to their self-interest. Transactional leadership emphasises the task-oriented exchanges of behaviours and reinforcements between the leader and team members (McCleskey, 2014). Therefore, the relationship between the transactional leader and members is characterised by agreed transactions, bargains and exchanges that influence team members to follow the course set by the leader (Trivellas & Drimoussis, 2013.

In the project setting, the role of contingent reward and active management by exception, actions of projects might be important. Contingent rewards are important for the provision of rewards and psychological materials contingent upon the demonstration of a particular performance target by team members. Through the provision of contingent rewards, the transactional leader can induce a reasonable amount of loyalty, commitment and output from team members. Through management by exception, a transactional leader ensures that followers adhere to predetermined standards. Tyssen et al. (2014) posited that transactional leaders actively monitor team members' work errors and anomalies and concentrate on planning projects and organising parts and actions. Therefore, transactional leadership thrives and ensures success in project conditions characterised by clearly defined roles, tasks and goals, and consistent workflow and processes (Anantatmula, 2010).

In determining project success, straightforward project characteristics provide a basis for determining the best managerial actions, whereas complex projects require an exceptional level of management because conventional project systems are inadequate. In simple projects, consistency in tasks, less ambiguity in project roles and reduced conflict among team members can assist project members in dealing with limited complexities of fact and interaction on the project, thereby enhancing the probability of project success.

Joslin and Müller (2016) postulate that in short-term and straightforward projects, transactional leadership might moderate the relationship between project complexity and project success. The effectiveness of transactional leadership is largely dependent on getting project team members to fulfil specific task obligations, and mostly through the use of rewards systems (Trivellas & Drimoussis, 2013). Transactional leadership represents an exchange process based on the fulfilment of contractual obligations and is typically embodied by the setting of objectives, and monitoring and controlling outcomes (Bass et al., 2003; McCleskey, 2014).

In addition, transactional leadership promotes one-way communication which minimises participation in project teams. However, long-term projects tend to be much more complex and are characterised by constant changes, which can be difficult to track and manage and can significantly minimise goal clarity (Raziq et al., 2018a). This leadership approach might be effective in projects that are not burdened by the complexities of faith, fact and interaction, which requires a much more dynamic and relational approach. In dealing with novel situations, which border on complexity by faith, an essential remedy is innovation, which is largely stifled by the limited participation of project team members when transactional leadership style is actively practised by project managers (Tyssen et al. (2014). Therefore, in novel and relatively long-term projects (i.e., complex projects) where the project leader

is expected to provide visionary leadership to ensure project success, transactional leadership would not moderate the relationship between project complexity and project success. Based on these discussions, the next hypothesis reads:

H6: *Transactional leadership will not moderate the relationship between project complexity and project success.*

2.4.6.3 Ethical Leadership as a Moderator

Anantatmula (2010) postulates that the ability of project leaders to establish trust between stakeholders is essential in order to achieve collaboration, knowledge-sharing, and effective managing of uncertainties or complexities during a project. When trust is established, the project environment becomes transparent with open communication, thereby enhancing members' interactions as well as collaboration in dealing with task uncertainties and complexities (Anantatmula, 2010; Sohmen, 2014). Ethical leadership is likely to ensure transparent and open communication in a project team, thereby equipping team members to deal with complexities of fact and interactions (through collaboration and knowledge-sharing on tasks), which lead to project success (Krog & Govender, 2015; Novo et al., 2017; Sohmen, 2014).

Ethical leaders promote good ethics and morals among the team members and with other stakeholders (Treviño et al., 2000, 2003). It is, thus, likely that when ethical leaders are faced with complexity, they will address it diligently and in a principled manner that is devoid of dubious, unfair, and illegal means. Individuals' trust largely depends on a leader's consistent and transparent ethical or unethical behaviour (Xu et al., 2016). Therefore, in order for individuals to develop trust in an organisation or project, the leader has to be the moral leader and individual. Xu et al. (2016) contended that a positive relationship exists between ethical leadership and employee performance on projects. The relationship between ethical leaders and stakeholders is dependent on mutual trust and fairness. Thus, project managers who display ethical leadership behaviours can enhance project performance and influence project success. Project success is also a result of clarity in the information and guidelines, enhancing the performance of routine project tasks. In a study by Ren et al. (2020) among human resources managers, chief financial officers and chief executive officers across the globe, it was found that ethical leadership moderates the positive relationship between human resource management activities of firms and their environmental performance in projects.

In typical construction projects, complexity may arise when dealing with the conflicting demands of the numerous project stakeholders. In managing diverse external stakeholders, one unique challenge

that characterises construction projects is the issue of bribery and corruption (Daniel & Ibrahim, 2019). Issues surrounding stakeholder management and associated issues such as bribery and corruption are characteristic of complexity by interaction. In construction projects, the ethical behaviour and integrity of the project leader and team members become integral to the success of the project. Ethical leadership ensures transparency and open communication and fosters trust between external stakeholders. In addition, the exemplary behaviours of the ethical leader, marked by the adherence to ethical principles, can become a strong deterrent for any unethical practices such as bribery and corruption.

The study, therefore, hypothesises that:

H7: *Ethical leadership will moderate the relationship between project complexity and project success.*

2.4.6.4 Project Leadership Roles as Moderators

Owing to the importance of seven project leadership roles for ensuring project success (De Klerk, 2014), these roles can be considered as potential moderators in the project complexity–project success relationship. It has been ascertained that leaders' provision of vision can help team members to deal with complexities associated with change and ensure project success (Herold et al., 2008; Senaratne & Samaraweera, 2015). Providing vision relates to the direction-setting role of project leadership (De Klerk, 2014). Vision encourages creativity and innovation, which can improve project team members' ability to deal with complexities, such as coming up with new ideas to enhance the project's efficiency (Atkinson et al., 2006; Uhl-Bien et al., 2007), which also relates to the catalyst of possibilities role of project leadership (De Klerk, 2014). Indeed, fulfilling the project leadership role of catalyst of possibilities is likely to positively influence complexity by faith as problems are less inclined to be seen as stumbling blocks, but rather just aspects that require a different approach. Inspiring and motivating all stakeholders (energiser and mobiliser) establishes a sense of team spirit among all project stakeholders, which enables them to deal with complexities of interactions within the team, improving team satisfaction and project efficiency (Bass, 1990; Chiocchio & Essiembre, 2009; Tyssen et al., 2014). Providing support and consideration for team members' individual needs and concerns (compassionate anchor) builds their trust and commitment and also enhances collaboration to overcome various forms of complexities on the project; hence, ensuring project efficiency, team satisfaction and customer satisfaction (Emery & Barker, 2007; Tyssen et al., 2014). When leaders define roles, clarify goals, use consistent processes, and actively monitor the performance of team members (orchestrating driver), they are able to reduce ambiguity, reduce conflicts, and serve as a

guide to the project – which all help to reduce complexities by fact and interactions, leading to higher probability of project success (Anantatmula, 2010; Senaratne & Samaraweera, 2015; Tyssen et al., 2014). Fulfilling the project leadership roles described in the preceding discussions is also likely to provide support to, and enhance, transformational leadership and further increase the probability of project success.

When leaders establish an ethical project culture and uphold ethics and morals among team members (ethical tone-setter), they are able to establish trust, which facilitates knowledge-sharing and collaboration, and subsequently aids members to deal with the complexities associated with new or old procedures, as well as interactions, leading to project success (Anantatmula, 2010; Senaratne & Samaraweera, 2015). The project leadership role of the ethical tone-setter is likely to correlate with, and complement, ethical leadership to enhance the probability of project success.

Project leaders can help their team members to deal with complexities by improving on interpersonal and technical skills (integrator) by building trust and collaboration, specifying goals and processes, and actively monitoring performance among team members (Anantatmula, 2010; Atkinson et al., 2006; Tyssen et al., 2014). As “culture bridgers” and political brokers, project leaders are able to manage and mediate between different cultures and maintain relationships and consensus among their members (Cullen & Leavy, 2017). The ability to manage relationships across different cultures equips project leaders to manage complexities of interaction that they may encounter within and outside the project environment, thereby promoting project success. Trivellas and Drimoussis (2013) found that leaders who inspire their teams to succeed exhibit some behavioural, managerial and emotional competencies. The study accentuated engagement and motivation, openness, assertiveness, conflict and crisis management, negotiation, consultation, reliability, value appreciation, and ethics as the behavioural competencies that managers should possess. Interpersonal relations, teamwork, energising, acculturation, coordination, and fostering innovation are essentials managerial traits that project leaders should possess. Self-awareness, social consciousness, and relationship management – which are considered as emotional intelligence – are also essential in the management of project teams for project success. Similarly, Cleveland and Cleveland (2020) found that leaders with high team awareness and motivation, emotional intelligence, cultural value awareness, and communication and team-building skills are more successful at influencing their followers, irrespective of their cultural backgrounds, to pursue goals and organisational objectives. Based on this, the study hypothesises that:

H8: *Fulfilment of the project leadership roles will moderate the relationship between project complexity and project success.*

2.5 The Construction Industry in Ghana

Ofori (2014) has indicated the need for more studies on project management and project success antecedents in emerging economies such as Ghana, particularly in the construction industry, given the low project success rate in that industry. This call was echoed by Damoah et al. (2020), who emphasised the need to study the success of construction projects because of the importance of the industry to development. In order to delimit the study and provide a workable focus, this study will focus on construction projects in Ghana as one specific example of an emerging economy. The construction industry remains a significant segment of the Ghanaian economy and an essential catalyst for growth (UNESCO, 2010). The construction industry's share of GDP and contribution to development in Ghana is 10.5% and 11.2%, respectively (Ghana Statistical Service [GSS], 2012). The GSS estimates that the construction industry experienced a growth rate of 16.3% year on year in 2016 (GSS, 2016). The government remains the largest client and financier of projects in the construction industry in Ghana, stimulating aggregate demand to achieve expansionary economic objectives (Ofori-Kuragu et al., 2016).

The Ghanaian construction industry is active and a massive employer of skilled and unskilled labour, including engineers, consultants and artisans (UNESCO, 2010). The key players or stakeholders of the Ghanaian construction industry include the design community, customer community (both public and private sectors), major contractors and subcontractors of every tier, the supply chain (material dealers, machinery manufacturers, sub-assemblers), universities, technological institutions, professional associations, trade unions (regulation and standards authorities), and economic drivers (banks and other financial institutions) (Famiyeh et al., 2017). The construction industry is multifaceted and creates a link between the industry and other sectors of the economy. The construction industry also requires services from the financial sector. The manufacturing and financial sectors may also require the services of the construction industry and, thus, make the linkage between these sectors dyadic. Construction, therefore, also has an impact on other sectors of a country's economy (Ofori, 2012a).

The Ghanaian construction industry is regulated by various laws, regulations, and legislation. These include Ghana's 1992 Constitution and the regulations of the Environmental Protection Agency Act 490 of 1994, such as the environmental impact assessment (EIA) of projects. Some of the policies to regulate the industry include the Environmental Sanitation Policy, National Land Policy and National

Wildlife Policy. Many of these regulations and legislations contribute to the complexity of construction projects. For instance, according to Article 41(k) of the 1992 Constitution, Ghanaian citizens, including large- and small-scale construction stakeholders, are mandated to protect and defend the environment (Agbenyega, 2014; Asamoah & Decardi-Nelson, 2014). The Environmental Protection Council, which is currently the Environmental Protection Agency, was instituted as a public organisation to oversee the duties of environmental agents under the National Redemption Council Decree, number 239 (NRCD, 239). The decree spells out the mandate of the Environmental Protection Council as ensuring proper precautions in the planning and implementation of developmental projects, so that they do not interrupt the quality of the environment. The Environmental Protection Agency is tasked with regulating the construction environment through developing and enforcing environmental regulations. These planning and building regulations have been modelled after the United Kingdom regulatory system. The Environmental Assessment Regulations also concentrate on the various procedures to be followed before a permit is issued to potential developers. Local government officials are charged to control the development in metropolitan and district assemblies (Twumasi-Ampofo et al., 2014).

The Ghanaian construction industry faces various challenges, such as unprofessional practices, corruption, and bribery (Asamoah & Decardi-Nelson, 2014). Lack of planning, water and power wastage, high building material usage, inability to meet client specifications, and fragmented stakeholder cooperation are some of the issues present in the construction industry (Twumasi-Ampofo et al., 2014). Another difficulty faced by the construction industry in Ghana is land supply. Traditionally, land is generally owned by families. Agreements about land use are thus dependent on the customs of families and tribes (Ofori, 2012b; Osabutey et al., 2014). Hence, a tribal chief might take his own decisions, or decisions may also be made collectively by a council of elders. However, these decisions or agreements are seldom documented in writing; thus, there is usually no evidence for usage rights. Therefore, ownership of the land may be uncertain (Ofori, 2012b; Osabutey et al., 2014).

There is underutilisation of appropriate technology in the Ghanaian construction industry and a tendency to import building materials rather than use alternative local materials (Amoatey et al., 2015). Delays in payment by the government for completed projects is another challenge faced by the construction industry in Ghana. Payment delays negatively affect the credibility of local contractors to their creditors. The completion of projects is delayed owing to delayed payments, which reduces contractors' profit margins and interest, and encourages corruption in the industry (Damoah & Kumi, 2018; Nubuor et al., 2017). The lack of adequate funding for projects usually reduces the performance

of the industry. The majority of construction projects led by the government are donor-funded; therefore, inadequate credit is given to these donors and especially banks in the private sector (Agbenyega, 2014; Asamoah & Decardi-Nelson, 2014). Access to financial services is mostly limited, which poses a problem for the organisation of employees and tools.

Many of the various construction projects that are carried out in the construction industry are needed to pursue socioeconomic development (Amponsah, 2010). In addition, management standards ensure long-term competitive advantage and business survival for construction firms (Ramlee et al., 2016). Agbenyega (2014) suggested that the early integration of quality management practices at the beginning of a project and the engagement of quality officers are critical resources that influence the successful delivery of construction projects in Ghana. Ofori (2012) maintains that the construction projects in emerging countries such as Ghana experience failure because of a weak economy and lack of appreciation by governments of the need and significance of the construction industry. Consequently, the construction industry in Ghana appears to be generally complex, and mostly resulting in poor project performance with regard to schedule, cost, and quality (Ofori, 2012a).

The construction industry in Ghana consists of two sub-sectors: the formal sector where projects are generally large and technically complex, requiring high levels of expertise and sophisticated machinery and materials, and the informal sector where projects are mainly in the housing sector, where clients are usually private individuals or small and medium enterprises (SMEs) (Amponsah,2010). Construction projects in the formal sector in Ghana have high levels of complexity, and these complexities increase the cost of projects (Ministry of Roads and Highways, 2015; Ministry of Works and Housing, 2015)

Ofori (2012) posited that poor project management skills and techniques in Ghana have rendered project teams incapable of dealing with complex construction projects, leading to unsatisfactory outcomes and a low project success rate. According to Shah (2016), most construction firms do not consider the complexity of projects during the planning and execution of projects, resulting in project delays in Ghana.

Duodu (2017) identified poor communication management between stakeholders as the main contributor to project failure in the country's construction industry. Frimpong et al. (2003) noted that the project complexity in Ghana's construction industry is primarily seen as emanating from the location (geographical complexities), type of contract (financial complexities), stakeholder interest (communication complexities), and the lack of expertise (operational complexities). The complexities

provide examples representing complexity by interaction, as advanced by Geraldi and Adlbrecht (2007).

The literature, although scanty, points to the fact that conditions such as poor health and safety, stakeholder expectations, and project uncertainty (complexity by faith) in Ghana are likely to contribute more to project complexity within the construction industry (Agbenyega, 2014; Ansah, 2011; Fugar & Agyakwah-Baah, 2010). This necessitates an inquiry into project complexity and project success relationships in the Ghanaian construction industry. Nubuor et al. (2017, p. 36) concluded that "project managers' influence, leadership style, project team members' coordination and resource availability, organisational success, timely completion of projects, and, ultimately, and client satisfaction, are critical determinants of construction project success in Ghana." Notably, the impact of the project leader is a key contributor to the success of projects in Ghana's construction industry (Famiyeh et al., 2017; Fugar & Agyakwah-Baah, 2010). Müller and Jugdev (2012) asserted that one way of dealing with project complexity to ensure project success is through effective project leadership, where project leaders understand and deal effectively with the complexities in their projects. As such, the ability of a project leader to adequately assess and address complex issues of a project can enhance understanding of the project, leading to its successful management and completion (Wood & Gidado, 2008). Muller et al. (2012) noted that the behaviours, leadership styles, and competencies of project leaders are crucial in dealing with complexities inherent in a project to successfully manage the project.

From the preceding discussions, it is clear that the large variety of regulations and requirements of the Ghanaian construction industry contribute to increased project complexity. For instance, complexities of fact are escalated by an ever-expanding set of information that needs to be considered, integrated, and synthesised in the planning and execution of a project. Complexities of faith are inflated by the influence of many of the aspects required which cannot be foreseen adequately and accurately during the planning phases of the project. Complexities of interaction are augmented owing to the significant level and breadth of interfaces and interactions that are required with a wide variety of stakeholders, with different needs and expectations.

3. PROBLEM STATEMENT AND OBJECTIVES OF THE RESEARCH

3.1 Problem Statement

In the project management literature, project success and project complexity have received extensive coverage. The direction of studies conducted on these two constructs generally suggests that the success of a project tends to be influenced negatively by the degree of complexity inherent in that project (Bosch-Rekveldt et al., 2011; Müller & Jugdev, 2012; Qureshi & Kang, 2015; Wood & Gidado, 2008). It thus follows that complex projects require an exceptional level of management skills and it has been demonstrated that leadership styles, roles, skills, and proficiencies are essential management competencies required for successful project management (Anantatmula, 2010; Geoghegan & Dulewicz, 2008; Müller & Jugdev, 2012; Müller & Turner, 2010; Ofori, 2014; Raziq et al., 2018a).

Project complexity presents various emotional, intellectual, and managerial challenges which can be mitigated through the use of appropriate leadership styles. In the case of general leadership, vision plays a significant role. However, the goal of a project is generally clearly spelt out. As a result, the role of a project manager has to be focused more on managerial activities such as planning, monitoring, and controlling, rather than on creating a vision (Clarke, 2012; Kaulio, 2008). Hence leaders are required to perform certain important duties that ensure that project outcomes and expectations are fulfilled.

Project management literature has focused on leadership styles such as transformational and transactional leadership (Aga, 2016a; Kissi et al., 2013; Rausch et al., 2005; Raziq et al., 2018a; Strang, 2005b), leadership competencies (Muller & Turner, 2010; Muller et al., 2012), and project leadership roles (Anantatmula, 2010; De Klerk, 2014; Senaratne & Samaraweera, 2015). Particularly, these studies have examined leadership in terms of its influence on project success (Aga, 2016; Imran et al., 2019; Naeem & Khanzada, 2017). According to Tyssen et al. (2014), the influences of leadership styles and roles vary considerably across project types and contexts and, as far as could be established, no study has investigated the influence of transformational leadership, transactional leadership, ethical leadership and project roles on project success at it relates to the complexity characteristics of a project. There is therefore the need for more studies to explore the influence of leadership under various project contexts and types (Tyssen et al., 2014). De Klerk (2014) asserted that preoccupation with traits and qualities as a means of unearthing effective leadership is too idealistic. He suggested that – rather than subscribing to long lists of leadership traits and behaviours – project leaders could focus on performing essential project leadership roles (i.e., direction setter, ethical tone-setter,

energiser and mobiliser, catalyser of possibilities, compassionate anchor, orchestrating driver, and integrator). De Klerk's (2014) work has not been subjected to wide empirical testing. This study seeks to investigate the moderating effect of project leadership roles as conceptualised by De Klerk (2014). These roles are postulated to have positive implications for project success (Bathallath et al., 2016).

Various leadership styles and roles can influence project outcomes in various unique ways, often depending on the project characteristics such as complexity (Famakin & Abisuga, 2016; Nixon et al., 2012). The implications of leadership influence on project outcomes across various project characteristics are immense and have not been adequately captured in research in emerging economies. For example, the following questions are as yet unanswered (Damasiotis & Fitsilis, 2019): Which of the leadership styles and roles influence project outcomes and which do not? Under which project characteristics can leadership influence be felt? What project outcomes are induced by project characteristics and under which leadership styles? The project management literature provides some answers to these questions, but there is much more to explore regarding construction projects in emerging economies.

Research on the relationship between project complexity and project success has been done predominantly in Western contexts and in developed economies (Bjorvatn & Wald, 2018; Floricel et al., 2016; Hanisch & Wald, 2014; Kermanshachi et al., 2016; Müller & Jugdev, 2012; Sicotte & Bourgault, 2008; Tatikonda & Rosenthal, 2000), with little focus on emerging economies. The dominance of studies on complexity and success by Western and largely developed countries creates an inherent challenge associated with generalising findings to other contexts such as Africa and other emerging economies. Therefore, some scholars, such as Aga (2016) and Ofori (2014) called for the expansion of studies on complexity and project success to emerging economies.

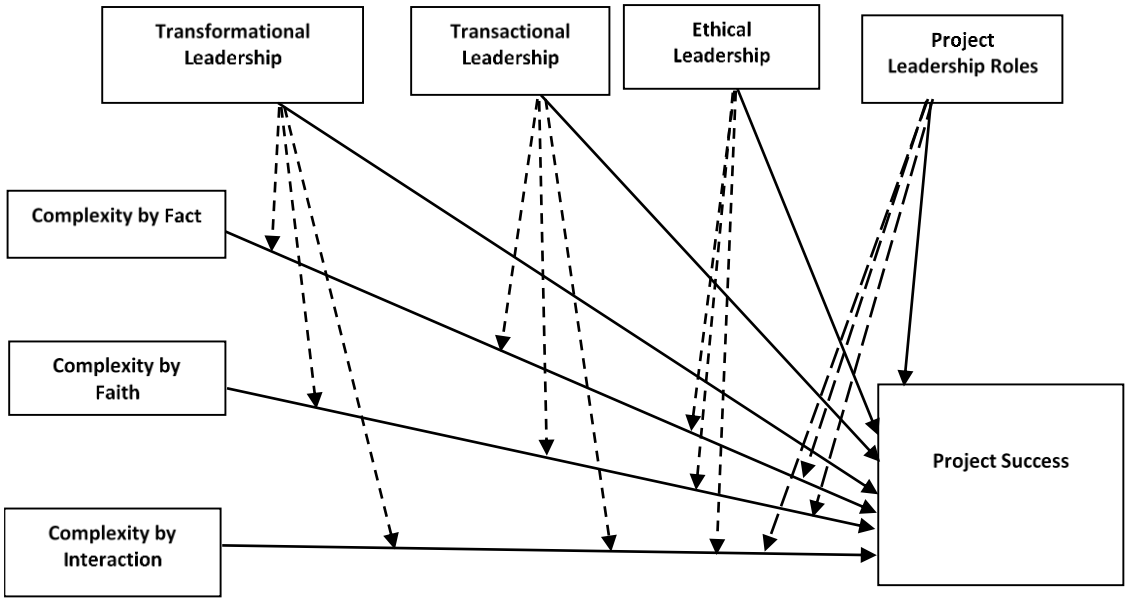
Within emerging economies, construction projects are important because the construction activities contribute to infrastructural growth and expansion and infrastructure is the bedrock for developing other sectors such as education, health, and housing. However, the industry is riddled with various challenges that generally threaten the effectiveness and efficiency of the sector (Amponsah, 2010; Ofori, 2012). In particular, the Ghanaian construction sector and the enormous complexity of construction projects escalating at an increasing rate have led to calls for more efficient and effective project managers and the enhancement of leadership skills (Agbenyega, 2014; Ofori-Kuragu et al., 2016). Ofori and Toor (2012) proposed that effective leadership is crucial to curtailing the risk of project failures. Ofori (2014) identified a paucity in studies on construction projects and leadership competencies. In Ghana, where project failure is thought to be high (Amponsah, 2010), it becomes

imperative to assess the influence that project complexity has on project success in its construction industry (Wood & Gidado, 2008).

Figure 1 encompasses project complexity, project leadership with project leadership roles as antecedents of project success. From the literature review and hypotheses, this study created a conceptual framework to depict the proposed relationships between the variables and their dimensions, as shown in Figure 1.

Figure 1

A Study Model of Leadership Styles, Project Leadership Roles as Moderators of Project Complexity-Project Success Relationship



The hypothesised relationships between the research variables and their dimensions are listed below:

- Project complexity (PC) comprising complexity by faith, complexity by fact, and complexity by interaction.
- Project success (PS) represents the dependent variable.
- Transformational leadership, transactional leadership, ethical leadership, and project leadership roles are moderating variables.

Figure 1 shows the hypothesised relationship between the independent variables: complexity by faith, complexity by fact and complexity by interaction, and the dependent variable project success. It shows the hypothesised relationship between transformational leadership, transactional leadership, ethical leadership and project success. The moderating effect of transformational leadership, transactional leadership, and ethical leadership, and project leadership roles in the relationship between project complexity and project success are also shown in Figure 1.

Ofori (2014) called for more project management studies in emerging economies such as Ghana, particularly in the construction industry, given the low project success rate in that industry. This call is echoed by Damoah et al. (2020), who emphasised the need to study the success of construction projects because of the importance of the industry to Ghana's development. As in many emerging economies, Ghana's construction industry is deemed a key contributor to the country's GDP (Amponsah, 2010; Asamoah & Decardi-Nelson, 2014; Famiyeh et al., 2017). The construction sector is also classified as complex and, given its importance, there is the need for more studies to be conducted on how project complexity affects project success and the mechanisms through which project complexity can be effectively managed (Asamoah & Decardi-Nelson, 2014; Famiyeh et al., 2017). The study seeks to measure the relationship between project complexity and project success and the moderating role of project leadership and roles in Ghana's construction industry.

3.2 Objectives of the Research

The aim of the study was to examine the antecedents of project success by focusing on the effects of project characteristics and managerial influences. The achievement of this aim was sought by investigating how project complexity (by faith, fact and interaction) relates to project success. Geraldi and Adlbrecht's (2007) project complexity dimensions of faith, fact and interaction provided a good foundation for such an inquiry, considering the comprehensive nature of these dimensions (Muller et al., 2012). Besides examining the efficaciousness of leadership styles and roles in project management and their potential for dealing with the complexities of projects (Anantatmula, 2010; De Klerk, 2014; Geoghegan & Dulewicz, 2008; Muller et al., 2012), the study also had the objective to investigate the fit between project leadership and project complexity. Further, research has barely considered project leadership styles and project leadership roles as potential moderators in the project complexity–project success relationship. As such, the differences between the influence of these leadership styles and roles on project complexity–project success relationship was seen as a relevant objective and worthy of pursuit.

3.3 Research Questions

The primary research question for this study was: “In what ways does project complexity relate to project success, and what is the role of leadership in the project complexity–project success relationship?” The research question sought to understand how project conditions and managerial influences affect the success of projects. Specifically, the study sought to answer these secondary research questions:

i. What is the meaning of project complexity (by faith, fact, and interaction) to project leaders and teams within the Ghanaian construction industry?
ii. How does each project complexity and its dimensions (by faith, fact, and interaction) relate to project success?
iii. How is project complexity related to project success?
iv. What are the relationships between project leadership styles (transformational, transactional, and ethical) and project success?
v. To what extent do these leadership styles moderate the project complexity–project success relationship?
vi. To what extent do project leadership roles moderate the project complexity–project success relationship?
vii. To what extent do the underlying factors, if any, influence the relationships between project complexity, project success, and project leadership?

3.4 Research Hypotheses

The hypotheses were formulated to explore the association between project characteristics, leadership influence and project success. The hypotheses proposed project complexity as an antecedent of project success and situated the relationship between project complexity and project success within the context of leadership styles and roles. The proposed hypotheses for the study were thus as follows:

H1a: *Complexity by faith has an inverse influence on project success.*

H1b: *Complexity by fact has an inverse influence on project success.*

H1c: *Complexity by interaction has an inverse influence on project success.*

H1d: *Project complexity has an inverse influence on project success.*

H2a: *Transformational leadership positively influences project success.*

H2b: *Transactional leadership does not positively influence project success.*

H2c: *Ethical leadership positively influences project success.*

H3a: *Transformational leadership moderates the relationship between project complexity and project success.*

H3b: *Transactional leadership does not moderate the relationship between project complexity and project success.*

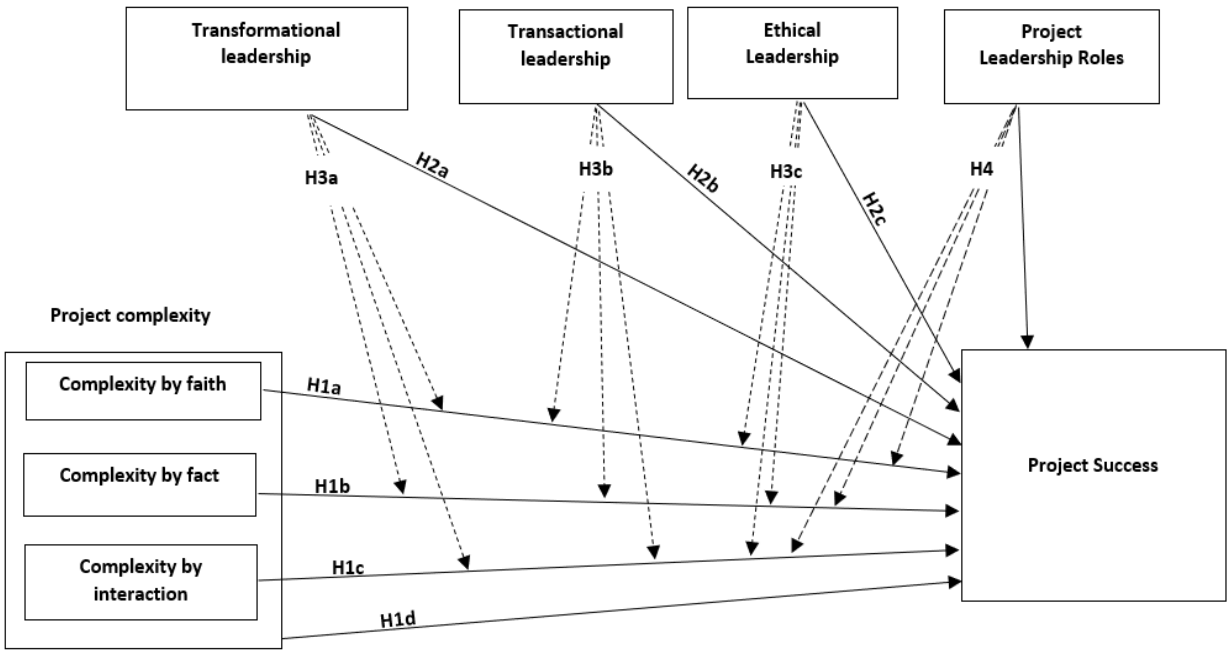
H3c: *Ethical leadership moderates the relationship between project complexity and project success.*

H4: *Project leadership roles moderate the relationship between project complexity and project success.*

Figure 2 shows the hypothesised relationship among the study variables.

Figure 2

A Hypothesised Model of Project Leadership and Roles as Moderators of Project Complexity-Project Success Relationship



4. RESEARCH METHODOLOGY

4.1 Philosophical Foundation

Several approaches are open to researchers in conducting research, and the approach they use may be deductive, inductive, or abductive (Creswell, 2014). These approaches influence the research design and paradigm selected for a study. According to Dudovskiy (2016), the commonest approaches adopted in research are the inductive approach (which comprises a chain of particular observations that lead the researcher to make a general conclusion that may be true or not) and the deductive approach (which commences with a hypothesis that is tested based on gathered data and, if true, leads to a specific conclusion).

4.1.1 Deductive Approach

According to Saunders et al. (2012), the deductive research approach adopts quantitative parameters to advance or test a concept or hypothesis. The goal of the deductive research approach is to arrive at extrapolatable conclusions, using quantitative data to test hypotheses. Dudovskiy (2016) posited that deductive inference allows a conclusion to be true if its premises are true. Thus, data collection in the deductive approach is used to evaluate hypotheses associated with an existing theory. Nevertheless, deductive research fails to consider the human interpretation of society – which is not the only criticism that has been advanced against the approach. It has been argued that the deductive approach lacks clarity in relation to the selection of theories to be evaluated through the formulation of hypotheses, and particularly concerning adequately explaining the reasons behind correlations that may or may not emerge from testing hypotheses. Thus, the qualitative design has been suggested as a remedy to the weakness of the deductive approach. The qualitative design provides an avenue for delving deeper into the findings emanating from the existence, or otherwise, of correlations among variables. In this study, the deductive and inductive approaches were, therefore, combined, thus allowing for further interrogation of research findings in terms of identified relationships between variables.

4.1.2 Inductive Approach

The inductive research approach uses mainly qualitative measures to arrive at a theory based on data analysis and focuses on smaller samples. The inductive approach is used to explore phenomena, identify themes and patterns, and create conceptual frameworks. The advantages of the inductive approach are that it is flexible, pays close attention to context, and supports the generation of new theories.

4.1.3 Abductive Approach

The abductive approach to research is described as a blend of deductive and inductive approaches. Its analytical approach alternates between empirical and theoretical aspects of analysis, which has made it more accepted in the literature. Dubois and Gadde (2002) argued that adopting the abductive approach is more prudent in research practice than the sole adoption of either the inductive or deductive approaches. Likewise, Lukka and Modell (2010) maintained that the abductive approach is progressively being accepted as a vital component of interpretive research. Some of the advantages that drove the current study to adopt the abductive approach included its ability to explore data to identify patterns to aid in suggesting plausible hypotheses. One crucial characteristic of the abductive approach is that it lends itself to methodological pluralism, leading to better research (Mitchell, 2018). Pragmatism was the ideal research paradigm for the current study since it allowed the researcher to pursue methods that best fitted every situation. Thus, a considerable degree of freedom was available to the researcher in selecting methods. Feilzer (2010) argued beyond the methodological advantage of pragmatism. In practice, pragmatism, as a research paradigm, is not just about the utilisation of quantitative or qualitative research approaches, but rather about a combination of both to enhance the understanding of research outcomes. Feilzer's commendation of pragmatism is rooted in how the approach makes it possible to blend varying research methods and analytical approaches that work well with perpetual rounds of abductive reasoning. However, observable phenomena and subjective meanings depend on research questions to arrive at acceptable knowledge (Dudovskiy, 2018).

4.1.4 Research Paradigm

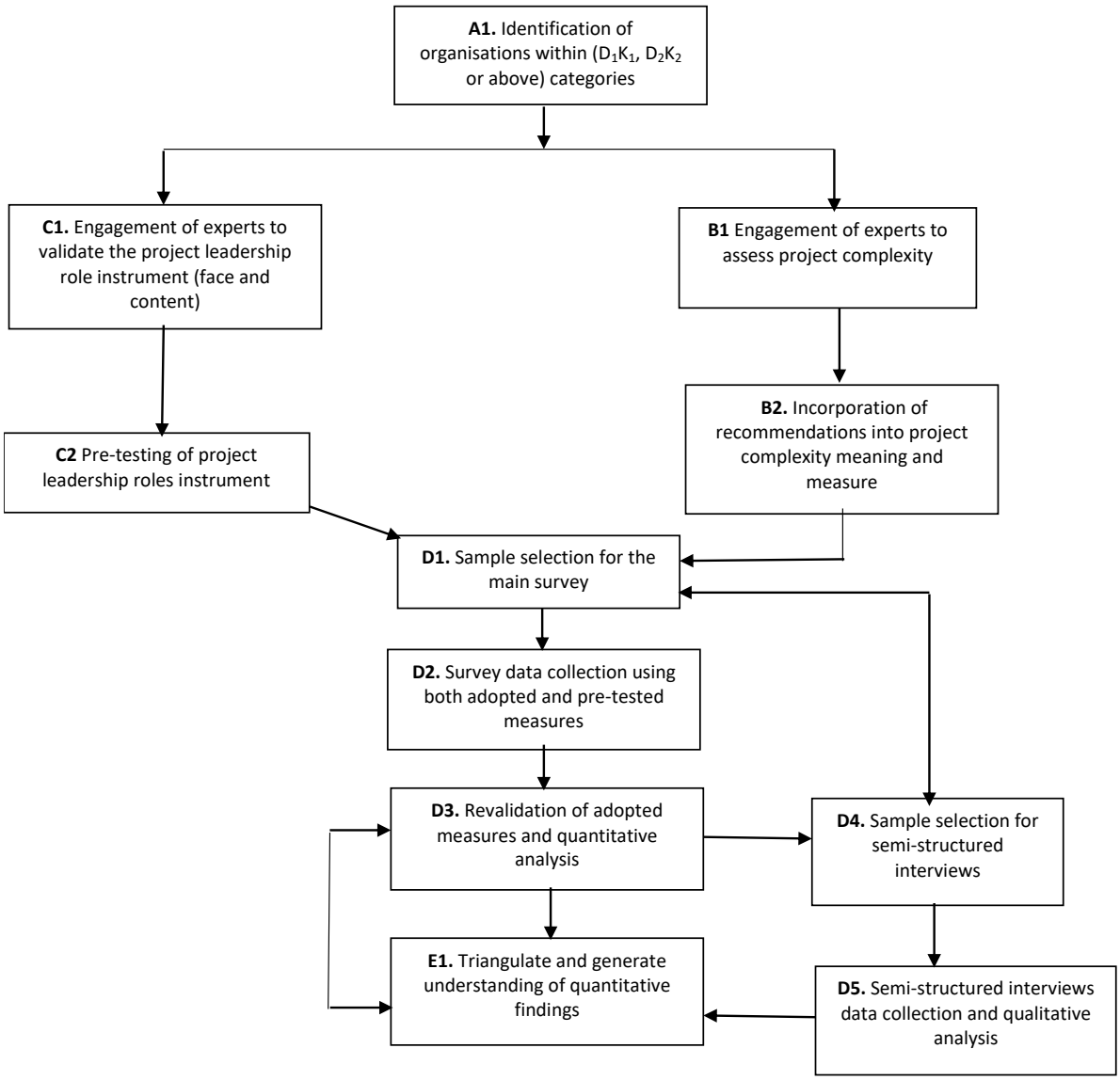
According to Saunders et al. (2012), the pragmatism paradigm is a philosophical standpoint that argues that one perspective cannot be enough to describe the world efficiently. Rather, the world can be interpreted in diverse ways through different types of research. This study used the paradigm of pragmatism. The stance of the researcher was that multiple perspectives were needed, particularly those relevant to understanding social phenomena and solving social problems. Hence, both subjective and objective sources of knowledge were required so that the findings of the study could be gathered from diverse angles. Additionally, researchers such as Bryman (2006) and Creswell (2014) had iterated that mixed methods reduce the shortcomings of using only quantitative or qualitative research approaches. Therefore, the researcher considered the pragmatism paradigm appropriate for the present study**.**

4.2 Research Design

The diagram in Figure 3 depicts the flow of research methods and the procedures employed for the study. The steps in Figure 3 are described in section 4.3.

Figure 3

Flow of Methodology



The study adopted the mixed methods approach. Specifically, this study employed the sequential explanatory mixed methods strategy, one of the six strategies under the mixed methods approach (Creswell & Plano-Clark, 2007). In this approach, data are first collected and analysed quantitatively, and then, based on the findings, qualitative data are collected and analysed to provide deeper insights and a better understanding of the initial findings. The study sought to determine how project complexity is comprehended in the Ghanaian construction industry; this assessment was done using the three dimensions of project complexity by relying on expert opinion. The study gathered data on the relationships between the constructs (using the contextualised measure for project complexity, project leadership styles, project success, and project leadership roles) (Step D1–D5, Figure 3).

Subsequently, qualitative data were gathered based on the findings of the survey to explain the relationships between project complexity, project success, and project leadership styles and roles (Step E1, Figure 3). This mixed methods approach was used to counter the limitations of using a single method. Furthermore, the approach had the advantage of revealing the underlying reasons for the findings. For instance, while the quantitative method mainly showed the relationships between project complexity and project success, abductive approach assessed the phenomenon from varying perspectives.

Consequently, the data collection and analysis processes of the study were done using the abductive approach (see 4.2.1 to 4.3). This was to ensure a higher success level and to determine the moderating role of project leadership and roles. As indicated, the qualitative method was used to gather information after the findings of the quantitative approach to show why and how project complexity is related to project success and why project leadership and roles are moderators or otherwise of the relationships. This strategy was considered appropriate because it would facilitate the use of different methods in collecting and analysing data on the study's variables, giving a more detailed explanation of the relationships between the variables.

4.2.1 Population

According to Quinlan et al. (2019), a study's population can be described as a well-defined set of individuals or objects with known characteristics. In this regard, the current study population comprised project managers, team members, and consultants in various organisations in the construction industry of Ghana (Step A1 from Figure 3). Information on organisations was sought from the Ghana Institution of Engineering to assist in identifying organisations (D1K1, D2K2) that had worked on complex construction projects. In the formal sector of the construction industry in Ghana (Amponsah, 2010), projects have been classified according to type and cost, by institutions such as the Ministry of Works and Housing (MoWH, 2015) and the Ministry of Roads and Highways (MoRH, 2015). The D1K1 and D2K2 categorisation by the MoWH and MoRH refer to organisations that qualify to undertake projects worth at least 200,000 US Dollars. The population of these organisations was estimated to be about 179, comprising both construction companies and consulting firms in the construction project industry (Step A1). These organisations were contacted directly and informed about the study's objectives. They were further informed of the various aspects of the study where their employees' participation was needed, and their consent and approval were sought so that their employees could be engaged. These organisations were given assurance of anonymity and confidentiality in respect of their information. They signed non-disclosure agreements with the

researcher. Upon approval, personal contact information (for example, names, contacts numbers, emails) of their project leaders and team members who had worked on projects of significant value and complexity were requested from the organisations. The number of project leaders and their teams in these organisations was estimated to be about 1074 in total.

4.3 Sampling and Sampling Procedure

Quinlan et al. (2019) defined a sample as a subset of a study's population chosen by using various techniques. Owing to the possibility of a poor response from respondents in the survey, all the estimated 1074 project leaders and team members were included in the survey by using the convenience sampling technique (Steps A1 and D1). The contact information of the population obtained from the organisations was used to contact the respondents (see Appendix A for the invitation letter). The study was conducted in three stages, and three sets of samples were selected for the study. The first sample was conveniently selected, comprising 10 participants (experts) made up of six project managers, who had at least 10 years of practical experience of complex construction projects, and four scholars. The 10 participants consented to be part of the study by signing a consent form. These participants were brought together physically to conceptualise project complexity in the Ghanaian construction industry (see B1, B2 in Figure 3) and check face and content validity assessment of the proposed project leadership role measure (Step C1 in Figure 3). Face validity refers to how a measure appears on the surface. The experts involved in this study reviewed the measure to check if the needed questions had been asked, their relevance, and the appropriateness of the language used. Content validity refers to the extent to which a measure thoroughly and appropriately assesses what it is intended to measure. The content validity for this study was assessed by relying on the judgement of the participants who were experienced professionals with a combined average experience of 15 years. Following the calibration of the project leadership role measure (Step C2), the measure was used as part of the data collection instruments in the second phase of data collection.

The second sample participated in a quantitative survey that had both the adopted and pre-tested measures (Step D2 in Figure 3). The respondents were first contacted via emails. The link to an online questionnaire was sent to participants. Printed hardcopies of the questionnaire were sent to those respondents who requested hardcopies. The participants were given two weeks to complete the questionnaire.

The final data collection stage involved some participants who participated in the quantitative study in Step D2 in Figure 2. A total of 20 participants were involved in the interviewing process (Step D4 in Figure 3), using convenient sampling techniques. Mason (2010) argued that qualitative researchers

should have a sample size of between five and 50. The respondents in this stage were those deemed to know the underlying reasons for the responses given in the survey (Step D5). The participants were contacted via cell phone or Zoom Cloud Meetings which is a proprietary video teleconferencing software program developed by Zoom Video Communications and were given a detailed explanation of the study. Via telephone or Zoom calls, the researcher sought the consent of respondents to participate in the study. Participants (Steps D4 and D5) who indicated their agreement to participate in the study were engaged. Those participants who indicated their unwillingness to participate were replaced with others until 20 respondents had been obtained. By the time the researcher interviewed 20 participants, there was no new information coming through the interview which represented the saturation point as recommended by Cooper and Schindler (2014). According to Cooper and Schindler (2014), the general sampling guideline for qualitative research is to continue sampling until no new knowledge is gained from respondents.

4.4 Research Instruments

A structured questionnaire (Step D2) and an interview guide (Step D5) were the instruments used for collecting data. The structured questionnaire consisted of six sections. The first section comprised demographic data such as age, sex, tenure, and project roles. The second section consisted of the project complexity scale.

4.4.1 Project Complexity

The study adopted the project complexity scale operationalised by Muller et al. (2012). The project complexity scale was constructed on the basis of the qualitative model proposed by Geraldi and Adlbrecht (2007). Project complexity was conceptualised as an umbrella term associated with the difficulty and interconnectedness, and variety and unpredictability (Geraldi & Adlbrecht, 2007) of construction projects. The scale identified three dimensions of project complexity: complexity of faith, complexity of fact and complexity of interaction. Geraldi and Adlbrecht (2007) defined complexity of faith as the complexity involved in creating something unique, solving new problems or dealing with high uncertainty. Complexity of fact refers to the complexity of dealing with a huge amount of interdependent information. Complexity of interaction is conceptualised as manifesting in interfaces between locations and characterises ambiguity and multiculturalism. The project complexity instrument has an original alpha value of ($\alpha = 0.86$), while Luo et al. (2019), Nguyen et al. (2019) and Fitsilis (2009) recorded alpha values of ($\alpha = 0.88$), ($\alpha = 0.76$) and ($\alpha = 0.91$), respectively. The reviewed scale (Step C1) was used to measure complexity on the dimensions of faith ($\alpha= 0.84$), fact ($\alpha= 0.88$), and interaction ($\alpha = 0.73$) on a 7-point Likert scale ranging from 1 = very low to 7 = very high. Both

face validity and content validity were assessed (Step C1) to ensure that the instrument was fit for purpose.

4.4.2 Project Success

The third section of the questionnaire measured project success using Shenhar and Dvir's (2007) Project Success Assessment Questionnaire. The project success scale was developed by Dvir (2007), using several case studies involving both qualitative and quantitative methods. The qualitative case study involving the analysis of 15 projects led to the identification of five major distinct success dimensions: *project efficiency, customer impact, team impact, business and organisational success, and preparing for the future*. The project efficiency dimension assesses the perception of respondents about time, budget, and other project requirements. Customer impact assesses the benefits of the projects to customers. Team impact assesses the effect of project outcomes on teams; business and organisational success assesses the project's overall benefits to the organisation's performance based on profit, market share and business-related outcomes; and preparation for the future assesses a project's long-term benefits after the project's completion. Following this, a quantitative investigation was carried out to test the measures' behaviour and provide support for the qualitative case study (Shenhar et al., 2001). Ahmed's (2017) study in Pakistan involving the use of the project success scale recorded an overall reliability alpha of (α = 0.85). The five dimensions (project efficiency α = 0.78; impact on customers α = 0.85; impact on team α = 0.86; business success and organisational success α=.89; preparing for the future α = 0.85) also showed strong reliability coefficients (Ahmed, 2017). Also, Ahmed et al.'s (2016) study found that the various dimensions of project success had a reliability coefficient of above 0.60 in examining management support and project success. To ensure that the instrument was reliable and valid for this study, face validity and content validity were assessed (Step C1). This would mean that the instrument was fit for purpose.

4.4.3 Transformational and Transactional Leadership Styles

The fourth section measured transformational and transactional leadership styles using the Multifactor Leadership Questionnaire (MLQ) Short Form-5X. The MLQ (5X) questionnaire is copyright-protected so permission was sought from Mind Green Publishers, USA, who granted a purchase licence for the use of the questionnaire. The original factor structure of the questionnaire was based on Burn (1978) description of transforming leadership. The original items of the questionnaire 142 in all were generated through an in-depth interview involving 78 executives who were asked to describe an influential leader. The original 142 items were further sorted into transformational and transactional contingent reward leadership categories. These were distilled to arrive at the final 73 items, after evaluation by 176 United States Army colonels.

The 73-item scale was later pared down by Avolio, Bass and Jung (1999) to 19 and 12 items that measure transformational leadership behaviours (α = 0.92) and transactional leadership behaviours (α = 0.70), respectively. Over the years, the development of transformational leadership theory has produced four dimensions under this leadership style: idealised influence, inspirational motivation, intellectual stimulation and individualised consideration. Inspirational motivation provides followers with a clear sense of purpose that is energising and a role model for ethical conduct and builds identification with the leader and their articulated vision. Intellectual stimulation prompts followers to question the tried-and-true ways of solving problems and encourages them to question the methods they use to improve on them. Individualised consideration focuses on understanding each follower's needs and works continually to develop them to their full potential. In contrast, transactional leadership produced three dimensions: contingent reward, management by exception (active) and management by exception (passive). Contingent reward clarifies what is expected from followers and what they will receive if they meet expected performance levels. Active management by exception focuses on monitoring task execution for any problems that might arise and correcting those problems to maintain current performance levels. Passive-avoidant leadership tends to react after problems become serious and takes corrective action, and these leaders often avoid making any decisions at all.

Studies that have adopted the scale have generally reported that the scale has strong psychometric properties. A study by Lorber et al. (2016) that examined the leadership styles of nurses reported that the transformational and transactional leadership scales had a Cronbach alpha of 0.960 and 0.937, respectively. In a study examining the influence of leadership styles on individual outcomes, Ismail et al. (2010) reported that the transformational and transactional scales had a Cronbach alpha of 0.950 and 0.844, respectively. Furthermore, studies by Naeem and Khanzada (2017) reported Cronbach alphas of (α = 0.87) and (α=0.73) for transformational and transactional leadership styles, respectively. Similarly, Dartey-Baah and Agbozo (2021) reported Cronbach alpha values of (α = 0.91) and (α = 0.72) for transformational and transactional leadership styles, respectively. Face validity and content validity were assessed (Step C1) to ensure that the instrument was reliable and valid for this study.

4.4.4 Ethical Leadership

Section E measured ethical leadership using the ethical leadership scale designed by Brown et al. (2005), consisting of 10 items (α = 0.94). According to Brown et al. (2005), ethical leadership demonstrates normatively appropriate conduct through personal actions and interpersonal relationships and promotes such conduct to followers through two-way communication, reinforcement and decision-making. These scholars argued that employees emulate the ethical

behaviours of their managers because leaders are credible role models at the workplace. Thus, the scholars propose social learning or social cognitive theory as the conceptual basis for ethical leadership. The study by Brown et al. (2005) developed an initial pool of 48 items based on ethical leadership and social learning theory. The initial 48 items were reduced to 10 items through seven different studies using different samples. The first four studies were conducted to examine the trait validity and internal coherence of the ethical leadership scale. The last three studies were conducted to examine the nomological validity of ethical leadership, with the final study concentrating on its incremental prediction. Over the years, the scale has been used in various studies, indicating the strong psychometric properties of the scale. These studies have also demonstrated that the ethical leadership scale has a high predictive power to explain various associated variables in organisational research. A study by Bhatti and Kiyani (2019) in the project environment showed that the ethical leadership scale had a reliability coefficient of 0.845. Another study by Walumbwa et al. (2011) reported a Cronbach alpha value of ($\alpha = 0.87$), while Toor SuR and Ofori (2009) reported a reliability alpha of ($\alpha = 0.90$) in their study in Singapore. Also, Sunderland's (2010) study noted a Cronbach alpha of ($\alpha = 0.75$). In other organisational studies, Okpozo et al. (2017) reported a reliability coefficient of 0.92, while Piccolo et al. (2010) recorded a reliability coefficient of 0.94. As part of the pilot study, face validity and content validity were assessed (in Step C1) to ensure that the instrument was reliable and valid for this study and ensuring that the items could effectively measure the construct in the Ghanaian construction industry.

4.4.5 Project Leadership Roles

Section F measured project leadership roles using the validated statements on each project role developed by the researcher based on the project leadership roles identified in the existing literature. The initial statements were based on studies of authors such as De Klerk (2014), Senaratne and Samaraweera (2015), and Cullen and Leavy (2017). Roles such as direction setting, ethical tone setting, and energising and mobilising were captured in groups of statements that were assessed on a 5-point Likert scale ranging from 'Strongly Disagree (1)' to 'Strongly Agree (5)'. In order to ensure validity and reliability, as many statements and roles as possible were developed; however, some of them were dropped to ensure validity and reliability (Step C2). Face validity and content validity were assessed (Step C1) to ensure that the instrument was reliable and valid for this study.

4.5 Validation of Survey Instruments

4.5.1 Face and Content Validity

Before their inclusion in the main survey, the measures of project leadership roles and project complexity were examined for their face and content validity (Step C1) and were pre-tested by the researcher (Step B2 and Step C1). The organisations in the Ghanaian construction industry identified within the study's population were requested to provide information on the experience of their project leaders through their human resources units after introductory letters had been sent to these organisations explaining the purpose of the study. After approval was granted, contact persons designated to the researcher by each organisation were contacted to provide a list of project leaders who had led project teams on complex organisational projects in the past. After this information was obtained, 10 experts (four researchers in project management from the University of Ghana and six project leaders with working experience of at least 10 years) were contacted through their organisations' human resources units. Requests were made to them to participate in the study to check the face and content validity of the instruments. Project leaders with the required experience who accepted the invitation to be part of the study were met individually by the researcher, who explained the purpose of the exercise to them. The researcher similarly contacted researchers in project management at the University of Ghana through its department offices and again the purpose of the exercise was explained to them in person by the researcher. Out of those who agreed to participate, four researchers and six project leaders were selected purposively. The 10 participants were asked to sign an informed consent form.

In a focus group discussion, the selected experts were asked to deliberate among themselves about their understanding of project complexity and their respective dimensions and about the appropriateness of the statements received from the researcher which were designed to measure both project complexity and project leadership roles. The deliberation among the selected experts was not moderated by the researcher in order to minimise any influence he might have on them. The experts were asked to evaluate statements adapted from Geraldi and Aldbrecht's (2007) project complexity scale, which was operationalised by Muller et al. (2012) on the dimensions of faith, fact and interaction, and statements on project leadership roles formulated by the researcher based on the works of De Klerk (2014), Senaratne and Samaraweera (2015), and Cullen and Leavy (2017). The experts shared their views on each statement and shared their thoughts on the relevance of the questions. They further identified questions that were considered irrelevant and recommended that additional questions which they considered relevant be added. The experts discussed each statement and reached a consensus on how those deemed appropriate applied to the construction industry,

while identifying those that were not relevant to the construction industry. Following the participants' discussions, the researcher met with them to clarify their collective views and opinions on the statements and how they applied to the industry, and also gathered their reasons for their submissions.

4.5.2 Pre-Testing of the Project Leadership Role Measure

Seventy-two respondents were sampled from the population for the pre-test phase of the project leadership role measure (B2). This is in line with Pergner et al.'s (2014) recommendations on the appropriate sample size needed (30–90 respondents) for pre-testing a research instrument to ensure high reliability and validity. Consequently, the use of 72 respondents was deemed adequate by the researcher to ascertain the validity (discriminant and convergent) and reliability of the items developed to measure project leadership roles (including recommendations from the experts). All 72 participants who took part in the data-gathering process were sampled using convenient sampling technique. They were given questionnaire in hardcopy format, as they requested. Since the questionnaire contained items on project leadership roles, the participants' consent regarding disclosure was sought before they responded to the statements. To ensure anonymity, participants were instructed not to write their names on the questionnaire. Once they had completed the questionnaire, the data were collated on an Excel spreadsheet, exported and analysed using the Statistical Package for Social Sciences (SPSS) and IBM AMOS.

4.5.3 Original Alpha Values of Measuring Instruments

The original alpha values of the measuring instruments (project complexity, project success, transformational leadership, transactional leadership and ethical leadership) are contained in Table 4.

Table 4
Original Measuring Instruments Alpha Values

Constructs	Original Alpha Values	Items
Project Complexity	0.86	12
Complexity by Fact	0.88	4
Complexity by Faith	0.85	4
Complexity by Interaction	0.73	4
Project Success	0.92	27
Transformational Leadership	0.92	19
Transactional Leadership	0.70	12
Ethical Leadership	0.94	10
Project Leadership Roles*	N/A	47

Note. **Instrument yet to be developed as part of the study*

4.6 Data Collection

4.6.1 Quantitative Data

The data collection for the study was done using a combination of online data collection mediums and printed questionnaires. To ensure total anonymity and confidentiality of responses, the survey was administered mainly online through Survey Monkey. Thus, the survey link was sent to the participants via email or text message using their contact information obtained from their organisations (Step A1). An informed consent form was included in the questionnaire and presented at the beginning of the survey. The purpose of the survey was explained to participants in the informed consent form and, upon agreement, they were requested to indicate their consent by clicking on a link that directed them to the questionnaire.

For participants who preferred to complete printed copies of the questionnaire, their anonymity was ensured as they were requested not to write their names on the questionnaire. Further, the completed questionnaires were collected in respondent-sealed envelopes to ensure anonymity. The data collected were kept securely locked in the researcher's office. The online responses were stored on a laptop that was password protected. For both the online responses and the printed questionnaire, only the researcher had access to the data. See Appendix B for Quantitative data collection instrument.

4.6.2 Qualitative Data

The qualitative data collection process took place after analysing the quantitative data collected during the survey (Step D5). The quantitative data analysis yielded some results that needed to be further clarified through a qualitative study. Consequently, the study employed a structured interview guide for the interviews based on the findings of the quantitative analysis to generate a better and deeper understanding of the relationships between the variables. Therefore, the questions for the interview guide were developed based on the findings of the data analysis of the main survey. The data collected involved interviews and analyses of the responses obtained. During the interviews, permission was sought from participants before the sessions were recorded, while the researcher also took handwritten notes of notable comments and reactions to some questions. Participants who objected to being recorded, however agreed that the researcher could take notes as they answered questions. The interviews were done via telephone and Zoom calls. The average duration of each interview was approximately half an hour. Every respondent was assigned a code (e.g., 'Respondent A') as a pseudonym to ensure anonymity and confidentiality. See Appendix C for Qualitative data collection instrument.

4.7 Data Analyses

4.7.1 Quantitative Analysis

The Excel spreadsheet data generated from the online survey were exported and analysed with SPSS (version 20) and AMOS (version 22.0). The Covariance-Based Structural Equation Modelling (CB-SEM) was adopted in analysing the quantitative data. This tool was chosen over the Partial Least Squares (PLS-SEM) because it makes use of several model fit indices, such as Comparative Fit Index, Goodness of Fit Index, in evaluating its measurement model (Confirmatory Factor Analysis) to determine whether the items that measured each construct were valid and reliable. The PLS-SEM, however, does not make use of such model fit indices (Hair et al., 2014).

Initial data analysis was conducted using SPSS to track and deal with missing values and outliers before SEM was conducted. Also, normal distribution in the data was ensured since it is a prerequisite for using SEM to test hypothesised relationships. Missing values were checked using Little's MCAR test and the expectation-maximisation algorithms which is an iterative method to find the missing values. Outliers were checked and dealt with using histograms and stem-and leaf-diagrams. Data normality was checked using the skewness and kurtosis of each latent construct. Data are normally distributed if the absolute values of the skewness and kurtosis of the variables are between -2 and +2 (Tabachnick & Fidell, 1996).

Hereafter, Confirmatory Factor Analysis (CFA) was conducted in AMOS to re-validate and ascertain item loadings, fit measures, and convergent and discriminant validity, just as done in the pre-test phase. The fit measures, which were considered in this study included the ratio of the Chi-square to the Degree of Freedom (CMIN/DF; $\chi 2/df$), the Goodness of Fit (GFI), the Adjusted Goodness of Fit, the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA) and the Standardised Root Mean Square Residual (SRMR). Testing the measuring instruments using the model fit indices is essential for confirming that the items are adequate and appropriate for measuring these constructs in the Ghanaian construction context. The researcher designed a structural model to test the hypothesised relationships between all the variables based on the CFA and retained items. This helped to test the influence of project complexity on project success and the moderating roles of project leadership styles and roles. The same fit measures for the CFA were used to ascertain the fitness of the structural models. For both the CFA and structural models, the standardised loadings and regression coefficients were used rather than the unstandardised coefficients for better accuracy in estimating item loadings and relationships between variables. Multiple regression was also used to support the moderation analyses done with structural equation modelling.

4.7.2 Qualitative Analysis

The recorded responses from participants were transcribed by the researcher, collated and analysed thematically. According to Braun and Clarke (2006), thematic analysis is a basic approach for analysing qualitative data. Thematic analysis is made up of six steps: familiarising with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. After transcription, the responses were reread by the researcher to familiarise himself with the data. The initial codes were generated after several rounds of reading and reviewing the responses. These codes entailed categorising answers from different respondents for the same questions. From these codes, broad themes were determined from similar answers. These themes were then reviewed and named for clarity purposes. The findings (themes) were, thereafter, validated by cross-checking the responses of the respondents with the respondents themselves (Braun & Clarke, 2006). Thus, in certain cases where some responses were unclear, the respondents were contacted via cell phone calls to clarify their responses to ensure that the right responses were captured.

The last step in the data analysis entailed a triangulation of responses from the survey results and the results from the qualitative data. The triangulation of responses was done by matching the results of the interviews to their corresponding survey results to facilitate a deeper understanding of the outcomes. For instance, the relationship between complexity by faith and project success was explored and clarified by using the interview findings.

4.8 Ethical Considerations

Ethical issues are an integral part of research. Specifically, ethical issues in research can be grouped into four main categories: informed consent, protection from harm, right to privacy, and honesty with professional colleagues (Leedy & Ormrod, 2001). The researcher requested permission from the organisations to engage their employees. These organisations were given assurance of anonymity and confidentiality in respect of their information. The researcher signed non-disclosure agreements with the organisations. Upon receipt of approval and consent, data were collected from the participants. All the participants involved in the qualitative and quantitative aspects of the study were asked to complete informed consent forms (see permission letter and informed consent form in Appendices D1- D3).

The questionnaire was completed either online using Survey Monkey or on hard copies. Survey Monkey provides the tools for survey creators to configure their surveys. Survey Monkey allows the survey creator to either collect anonymous responses or identify participants. Survey Monkey does not have access to the survey responses unless the survey creator grants permission. In this research,

the researcher did not include questions in the survey from which sources could be identified. The researcher turned on the anonymous response option in setting up the online survey. Moreover, Survey Monkey was not given access to view the content of participants' responses. In ensuring anonymity for the printed questionnaire, the researcher did not include any questions revealing identity in the survey. Further, the completed questionnaire was collected in respondent-sealed envelopes to ensure anonymity. To ensure anonymity and confidentiality in the qualitative studies, participants were not requested to give their names or any specific personal information.

Furthermore, permission was sought from the respondents at the commencement of the interviews to record their responses. Respondents were assigned codes (for example, Participant A) as pseudonyms to protect their identities. These codes were known by only the researcher and the corresponding participant to aid in cross-checking and verifying of their responses. The researcher handled their responses, thereby ensuring the confidentiality of the data obtained from them. In reporting and presenting the results, the researcher ensured that their answers did not present any information that could be used to identify them, while also keeping the originality and substance of the research in mind. Data from the study were stored and backed up on password-protected laptops and storage devices that only the researcher could access to ensure security of the data and findings.

5. VALIDATION OF PROJECT COMPLEXITY AND PROJECT LEADERSHIP ROLE INSTRUMENTS

5.1 Face Validation of Project Complexity Instrument

This section of the study sought to confirm the face validity of Geraldi and Adlbrecht's (2007) conceptualisation of the three dimensions of project complexity (faith, fact, and interaction), and each of the items within the construction industry in the Ghanaian context, as a heuristic for emerging economy. Ten experts from the construction industry and project management researchers in Ghanaian universities were sampled and brought together for a focus group discussion on the three main dimensions of project complexity (i.e., complexity by faith, complexity by fact, and complexity by interaction). Specifically, the experts comprised an architect, three civil engineers, an electrical engineer, three project management lecturers, and two contractors with an average experience of more than 16 years each.

Participants were asked to discuss and assess all 12 items of the project complexity scale and their respective dimensions to assess the face validity and content validity. This was done by determining how applicable and relevant the dimensions and their respective items were considered to be in the Ghanaian construction industry. The focus group discussion was led by one of the experts, a project manager with over 25 years of experience. The participants also discussed each of the items of the seven dimensions of the project leadership roles. This process was conducted without the participation or interference of the researcher to obviate potential biased influence. The lead participant agreed to record the discussions both in writing and with a tape recorder. The participants were given pens and note pads and encouraged to write down comments about each item during their discussions. The participants discussed each statement until they reached an agreement on how applicable it was to the Ghanaian construction industry before they moved to the next statement. During the discussion, the participants shared their individual views and opinions on each statement and how each statement applied to the construction industry in Ghana, explaining their views with notable examples from their professional and academic experiences. After the discussion, the notepads and audio recording were collected. The focus group discussion lasted for six hours. Table 5 provides a summary of the participants' comments on the items of the different project complexity dimensions. The text in italics in the table captures the summarised comments of the participants on each of the original items of Geraldi and Adlbrecht (2007)

Table 5

Participants' Summarised Comments on Geraldi and Adlbrecht's (2007) Project Complexity Items

	Original Items	Experts' comments	Theories Backing Findings
Complexity by Faith	1. When a project requires new methods and ideas that are not widely known, I encounter difficulties.	Agreed with wording and meaning: *Complexities arise because working through a project life cycle can be difficult with uncertainties.*	Sense-making theory (Weick & Roberts, 1993)
	2. The number of changes made to the technical scope poses difficulties for me on a project.	Agreed with wording and meaning: *Scope changes enhance uncertainties, making projects more complex.*	
	3. I encounter difficulties associated with the effects of changes made to the project.	Partially agreed with the wording. Decoupled the statement emphasising (i) technical and (ii) scope changes: New statements: *(i) I encounter difficulties associated with the effect of technical changes on the project.* *(ii) I encounter difficulties associated with the effect of scope changes on the project.*	
	4. I experience complexities due to project uniqueness (e.g., new client, new technology).	Agreed with wording and meaning: *Using new technologies without adequate knowledge is a huge risk with inherent complexities.* Composite assessment of complexity by faith: *Agreed with the general concept of complexity by faith except that, in Ghana, project teams tackle project activities that require some innovation and novelty only when there is some evidence that the project outcomes are likely to be good.*	
Complexity by Fact	1. The amount of information to be processed on a project poses difficulties for me.	Agreed with the wording and meaning: *More information on projects require making good decisions through a thorough review of the data and therein lies the complexities.*	Structuration theory (Ferdoush, 2020)
	2. The number of people and organisations involved in a project poses difficulties for me.	Agreed with wording and meaning: *Different people may have different interests with the propensity to affect project scope and enhance the complexity.*	
	3. I encounter complexities as a result of the interdependency of technology, people and organisations on a project	Agreed with wording and meaning: *Improper handling of interdependencies can result in complexities invariably affecting project outcomes. usually negatively*	
	4. The characteristics of the project, such as size, pose difficulties for me.	Agreed with wording and meaning: *Large project sizes often come with more people involvement (multidisciplinary teams, etc.), a recipe for complexity and difficulty.* Composite assessment of complexity by fact: *Agreed with the overall conceptualisation of complexity by fact, as advanced by Geraldi and Adlbrecht (2007).*	
Complexity by Interaction	1. Depending on the level of locality or internationality of a project, I encounter difficulties.	Agreed with wording and meaning: *Not keeping to standards in case of local projects and communication challenges for international projects are areas of complexity.*	Social capital theory (Ali-Hassan, 2009)
	2. The multidisciplinary level and nature of a project pose difficulties for me.	Agreed with wording and meaning: *Lack of effective leadership and emotional intelligence among team members enhance complexity and difficulties.*	
	3 The degree of transparency of information required on a project results in complexities for me.	Agreed with wording and meaning: *Holding on to information meant for the team can lead to difficulties and enhance complexity.*	

	Original Items	Experts' comments	Theories Backing Findings
	4 I encounter difficulties as a result of empathy with the various stakeholders on a project.	Agreed with wording and meaning: *The difficulty of meeting unbudgeted requests of some stakeholders can potentially make such stakeholders unsupportive and thereby enhance complexity.* Composite assessment of Complexity by interaction: *Agreed with the overall conceptualisation of complexity by interaction, as advanced by Geraldi and Adlbrecht (2007).*	

Although the participants agreed with the appropriateness of the term "complexity by faith," they did not feel comfortable that complexity by faith can be construed as the complexities associated with "unknown" factors. The participants indicated that they would not step into the unknown or try novel ideas on projects unless at least one project team member had some knowledge about what was to be done, no matter how little it might be, or there was some information or guidance from credible published academic materials on how to navigate the novelty.

The explanation of the difference in the applicability of complexity by faith between the notions of Geraldi and Adlbrecht (2007) and the experts can be explained by the sense-making theory. Sense-making theory is about a social exchange process through which people understand, interpret and construct accounts of events to enable them to understand their circumstances as they happen to be (Brown et al., 2015; Weick et al., 2005). Sense-making theory serves as a framework for explaining how individuals or groups make sense of new and emergent situations which they usually encounter. Sense-making is a social procedure which is greatly affected by individual differences in thoughts, feelings, and behaviours (Heath & Porter, 2019). The significance of sense-making lies in the fact that it empowers people to act by creating meaning out of the ambiguities and changes in the world (Sutcliffe, 2013). Project complexity of faith creates a state of uncertainty which can act as a catalyst for multiple interpretations by various actors. Complexity of faith provides various interpretations which arise from the inadequacy of predetermined procedures. The characteristics of novelty, uncertainty, and ambiguity which represent a break in expected experiences create the need for sense to be created as a basis for action (Alderman et al., 2005; Fellows & Liu, 2017; Stingl & Geraldi, 2017; Van der Hoorn & Whitty, 2017). The disturbance to the flow of expected experiences pushes project members to focus on the change and to attempt to mitigate the disturbance.

The participants agreed with the conceptualisations of complexity by fact, as advanced by Geraldi and Adlbrecht (2007) and Dunović et al. (2014). Dunović et al. (2014) stated that complexity by fact occurs in projects when project teams have to deal with large volumes of interdependent information. The complexity by fact aligns with aspects of the structuration theory which states that for an organisation to be able to disseminate and process information it needs well-structured communication systems

and channels, without which complexity by fact becomes difficult to handle (Giddens, 1984; Hinojosa et al., 2017).

The participants agreed with the conceptualisation of complexity by interaction as advanced by Geraldi and Adlbrecht (2007). In the Ghanaian construction industry, complexity by interaction factors include complexities relating to the nature of the project (local or international) being executed, the multidisciplinary level of professionals involved in the project and relationship management. In view of the complex and knowledge-intensive nature of construction projects, such projects require considerable social capital for the effective collaboration between all stakeholders. In this regard, the social capital theory may provide a valuable framework and insight into explaining knowledge-sharing behaviour in project contexts (Bartsch et al., 2013; Di Vincenzo & Mascia, 2012).

5.2 Development of the Project Leadership Role Instrument

De Klerk's (2014) project leadership roles were adopted for the current study because they are more in-depth than those of other authors (Ahmad & Loch, 2019; Al-Khaled, 2016; De Vries, 2007, Senaratne & Samaraweera, 2015; Cullen & Leavy, 2017). De Klerk's (2014) project leadership roles comprise seven dimensions. The project leadership roles are as follows:

- Direction setter: The direction setter establishes the vision of the project and through communication, rallies project stakeholders behind the vision.
- Ethical tone setter: The ethical tone setter establishes ethical standards through exemplary conduct for project stakeholders.
- Energiser and mobiliser: The energiser and mobiliser creates a positive and supportive environment by inducing a boundless flow of determination (high energy levels) and a commitment that is contagious and pervades all ranks.
- Catalyst of possibilities: The role of catalyst of possibilities involves creating a supportive project environment that induces creativity and innovation.
- Compassionate anchor: The role of a compassionate anchor involves demonstrating care and supportive behaviours to achieve stability and consistency for the project team.
- Orchestrating driver: The orchestrating driver initiates appropriate steps and monitors progress throughout the course of the project towards the achievement of project goals.
- Integrator: The role of the integrator involves harmonising all the functions, activities, and processes towards the achievement of project goals.

The project leadership roles, as identified by De Klerk (2014), were used by the researcher to develop the items included in the project leadership role instrument (PLRI). The researcher initially developed

51 items in the form of statements based on De Klerk's work and the works of Senaratne and Samaraweera (2015) and Cullen and Leavy (2017) for the seven dimensions of the project leadership roles. The dimensions and their associated items were direction setter (seven items), ethical tone-setter (three items), energiser and mobiliser (nine items), catalyst of possibilities (seven items), compassionate anchor (six items), orchestrating driver (seven items) and integrator (11 items). The differences in the number of items per dimension reflect the extent of elaboration the experts gave on each dimension when they were assessing the face validity and content validity of the items. A 5-point Likert scale was selected to measure the items, ranging from Strongly Disagree (1) to Strongly Agree (5).

Through a focus group discussion, the same group of experts who considered the face validity and content validity of the project complexity measure were requested to review each of the seven project leadership roles and their associated items for comprehensiveness and clarity and to comment on the proposed 5-point Likert measurement scale. The participants also discussed each of the items of the seven project leadership role dimensions. The panel of participants deliberated among themselves to determine whether each statement made sense, was clear and unambiguous, and measured what it was intended to measure. This process was done without the participation or interference of the researcher to control for bias. The participants were asked to comment and suggest additional dimensions for project leadership roles or items. Where there were perceived duplications and overlaps between items, the participants discussed and either merged or dropped items. Following the review, the participants agreed that De Klerk's (2014) project leadership roles were comprehensive and appropriate for the study. The participants were also in support of the appropriateness of the proposed 5-point Likert measurement scale.

After the validation process, the researcher met with the participants to clarify and finalise their recommendations and suggestions, after which relevant changes were made to the initial instrument. The final instrument had seven dimensions with a total of 50 items. The dimensions and their associated final items were direction setter (seven items), ethical tone-setter (four items), energiser and mobiliser (eight items), the catalyst of possibilities (seven items), compassionate anchor (six items), orchestrating driver (seven items) and integrator (11 items). The discrepancies in the number of items after the validation process had to do with the participants having to merge, drop or suggest additional items during the validation process.

The final project leadership role instrument items were sent to the focus group participants via email in which they had the opportunity to indicate their satisfaction with the changes made to the

instrument based on their recommendations. The instrument sent to the participants elicited no comments as they all agreed with the contents of the instrument. Table 6 contains the final PLRI items and dimensions. After the instrument was approved by the expert participants, it was prepared for pre-testing with a sample of respondents.

Table 6
Final Project Leaders Roles Instrument Items and Dimensions

Scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

Items	1	2	3	4	5
List 1 – Direction setter					
1. My project leader is a visionary.					
2. My project leader inspires me.					
3. My project leader engages me.					
4. My project leader is focused.					
5. My project leader is committed.					
6. My project leader sets goals for the team.					
7. My project leader is able to lead diverse teams.					
List 2 – Ethical tone setter					
8. My project leader is a role model.					
9. My project leader is morally upright.					
10. My project leader is sincere.					
11. My project leader is honest.					
List 3 – Energiser and mobiliser					
12. My project leader is optimistic.					
13. My project leader is energetic.					
14. My project leader is often excited about projects.					
15. My project leader is persuasive.					
16. My project leader is actively involved in the project.					
17. My project leader creates confidence.					
18. My project leader encourages team members in decision-making.					
19. My project leader promotes discussions.					
List 4 – Catalyst of possibilities					
20. My project leader is creative.					
21. My project leader is innovative.					
22. My project leader is dynamic.					
23. My project leader is spontaneous.					
24. My project leader is flexible.					
25. My project leader has good technical skills.					
26. My project leader is proactive.					
List 5 – Compassionate anchor					
27. My project leader is caring.					
28. My project leader is empathetic.					
29. My project leader is understanding.					

Items	1	2	3	4	5
30. My project leader is supportive.					
31. My project leader offers praise to members.					
32. My project leader gives adequate and timely feedback.					
List 6 – Goal orchestrator					
33. My project leader is results-driven.					
34. My project leader is a diligent monitor.					
35. My project leader is fully informed.					
36. My project leader is an advisor.					
37. My project leader provides adequate structures.					
38. My project leader gives clear task direction.					
39. My project leader observes and inquires where necessary.					
List 7 – Integrator					
40. My project leader has good interpersonal skills.					
41. My project leader has good technical skills.					
42. My project leader is sensitive.					
43. My project leader has diagnostic skills.					
44. My project leader displays wisdom.					
45. My project leader resolves conflicts.					
46. My project leader collaborates to create strong relationships.					
47. My project leader conducts two-way communication with team members.					
48. My project leader establishes various channels for interactivity.					
49. My project leader mediates to accommodate aspects of foreign culture.					
50. My project leader negotiates and builds to maintain agreement among those on the projects.					

5.3 Pre-Testing of the Project Leadership Role Instrument

Pre-testing of the PLRI was done by assessing it with a sample of 72 respondents from the identified study population. This is in line with the recommendations of Perneger et al. (2014) on the appropriate sample size (30–90 respondents) for pre-testing a research instrument to ensure high internal reliability and validity. As recommended by Kothari (2004), the participants in the pilot study were excluded from the main survey that was later conducted after the pre-testing. The process followed for pre-testing the PRLI is discussed in the following sections.

5.3.1 Step 1: Preliminary Analysis

Preliminary statistical analysis was done to ensure that the data collected conformed with all the fundamental requirements and assumptions. Structural Equation Modelling (SEM) analysis requires data to be normally distributed and without missing values in the data entries. Assessment involved data screening of missing data, outliers, and normality of the data.

5.3.1.1 Missing Value Analysis

According to King (2013), missing data are common in all studies and can influence the conclusions drawn from the data. The notable categories of missing data that must be identified and dealt with are those missing completely at random (MCAR), those missing at random (MAR), and those missing not at random (MNAR). According to Little and Rubin (1987) and Kang (2013), MNAR data are those missing values in a data set related to the specific variables under which they are missing. Owing to the problems that MNAR data are likely to pose to analysing a data set, they must be addressed (Hair et al., 2006).

There are several techniques to control missing values, which include list wise/case deletion, pairwise deletion, mean substitution, expectation-maximisation (EM) (Combrinck et al., 2018). Missing values can be deleted or estimated using the expectation-maximisation technique (Schreiber et al., 2006). The EM method is the most suitable statistical technique as it adequately estimates missing values even in cases of non-normal data compared to other methods that usually produce lopsided estimates and miscalculate the standard errors (Gold & Bentler, 2000; Moss, 2016). Also, EM is well suited for the Maximum Likelihood Estimation (MLE) employed in this study under the SEM analysis. The MLE specifically helps to produce an accurate fit of the hypothesised model to the covariance matrix in the data set (Crisci, 2012).

5.3.1.2 Outliers

An outlier is any observation point that is abnormal compared to other observations and is deemed to influence the normal distribution of the data adversely. It is, therefore, imperative that the data set is considerably free from outliers when analysing it. With the aid of histograms and stem-and-leaf diagrams, the data were checked for outliers for each dimension under the observed variable. The analysis showed that there were no outliers; thus, the normality of the data was tested and confirmed.

5.3.1.3 Test for Data Normality

According to Silverman (2018), it is a prerequisite that collected data are normally distributed in order to avoid instances of bloated figures and ensure that the accuracy and reliability of conclusions drawn from the data are not compromised. Data normality was assessed using the skewness and kurtosis test for each of the dimensions under the project leadership role construct. According to Tabachnick and Fidell (1996), data are normally distributed in a data set if the absolute values of the skewness

and kurtosis of the various latent constructs are between -2 and +2. This analysis was performed in SPSS, and the results are presented in Table 7.

Table 7
Results Showing Univariate Test of Normality

Variable	Min	Max	Skewness	C.R	Kurtosis	C.R
Direction Setter	18.00	35.00	-0.84	0.28	0.67	0.56
Ethical Tone Setter	8.00	20.00	-1.03	0.28	1.63	0.56
Energiser Mobiliser	25.00	40.00	-0.32	0.28	-0.39	0.56
Catalyst of Possibilities	20.00	35.00	-0.19	0.28	-0.04	0.56
Compassionate Anchor	12.00	30.00	-0.93	0.28	1.02	0.56
Orchestrating Driver	22.00	35.00	-0.45	0.28	0.00	0.56
Integrator	26.00	55.00	-0.61	0.28	1.13	0.56

Note. *C.R represents Composite Reliability*

Based on Tabachnick and Fidell's (1996) reasoning, the results in Table 7 indicate that all the skewness and kurtosis values obtained for the various latent constructs fell between -2 and +2, indicating a normal distribution in the data set for each project leadership role dimension.

5.3.2 Step 2: Exploratory Factor Analysis

As the PLRI is a newly developed instrument, exploratory factor analysis was conducted to examine the data set to establish the factors and their respective items and to assess the data set for redundancy.

Table 8
Summary of Results Showing Factor Analysis of the Study Variables

Variables	CVE (%)	KMO	Bartlett's Test	*p*-Value	No. of Items
Direction Setter	52.85	0.86	169.09	0.00	7
Ethical Tone Setter	61.62	0.74	89.00	0.00	3
Energiser Mobiliser	54.60	0.84	165.79	0.00	8
Catalyst of Possibilities	62.50	0.80	147.99	0.00	5
Compassionate Anchor	56.57	0.85	149.33	0.00	6
Orchestrating Driver	59.32	0.77	120.88	0.00	7
Integrator	60.84	0.84	375.91	0.00	11

Note. *CVE represents Common Vulnerabilities and Exposures; KMO is Kaiser-Meyer-Olkin*

For a data set to be fit for further analysis, the conventional thresholds for KMO value (a measure of how suited data is for factor analysis) should be greater than 0.5 (> 0.5), CVE should also be greater than 50% (>50%), and Bartlett's test value should be significant at 5% confidence level. Table 8 shows the results of KMO, CVE and the *p* values of Bartlett's test, signifying that the data collected for the variable is adequate to measure what it is expected to measure (Bartlett, 1951; Fornell & Lacker, 1981).

5.3.2.1 Item Reduction

In developing a scale, there might be the need to carry out item reduction analysis to ensure that only items that are internally consistent, parsimonious, and purposeful are finally used (Thurstone, 1947). The item response theory and classical test theory support this analysis as far as scale development is concerned (Fan, 1998). The item response theory was used in this analysis because it models how the dimensions show themselves with respect to the observable item response (Harvey et al., 1999). Also, the IRT allows the researcher to know the effect of an item when it is deleted or added through observing the information provided by that item within the pool of items (Harvey et al., 1999).

Principal component analysis was used as the extraction method and Promax with Kaiser Normalisation as the rotation method. The pattern matrix holds the loadings (regression coefficients) and each of the items loaded on the respective factor/dimensions (Thompson, 2004) with some issues of cross-loadings (see Table 9). From Table 9, the project leadership roles dimensions are represented as: 1 = Integrator; 2 = Energiser and mobiliser; 3 = Compassionate anchor; 4 = Direction setter; 5 = Goal orchestrator; 6 = Ethical tone setter; 7 = Catalyst of possibilities.

Table 9
Pattern Matrix

Items	Dimensions						
	1	**2**	**3**	**4**	**5**	**6**	**7**
1. My project leader has good interpersonal skills.	**.779**	.023	.041	.046	.037	.029	.045
2. My project leader has good technical skills.	**.883**	.013	.043	.015	.019	.023	.004
3. My project leader is sensitive.	**.819**	.031	.034	.023	.026	.036	.031
4. My project leader has diagnostic skills.	**.677**	.053	.043	.089	.016	.029	.093
5. My project leader displays wisdom.	**.883**	.019	.006	.086	.001	.003	.002
6. My project leader resolves conflicts.	**.819**	.061	.031	.024	.013	.030	.022
7. My project leader collaborates to create strong relationships.	**.737**	.013	.156	.043	.038	.011	.002
8. My project leader conducts two-way communication with team members.	**.889**	.018	.023	.009	.030	.013	.018
9. My project leader establishes various channels of interactivity.	**.748**	.042	.118	.062	.014	.011	.005
10. My project leader mediates to facilitate aspects of foreign culture.	**.853**	.024	.019	.066	.017	.006	.015
11. My project leader negotiates to maintain agreement among those on the projects.	**.637**	.148	.019	.116	.006	.028	.048
12. My project leader is optimistic.	.033	**.800**	.043	.036	.024	.005	.059
13. My project leader is energetic.	.013	**.742**	.183	.002	.013	.021	.026
14. My project leader is often excited about projects.	.017	**.893**	.016	.028	.019	.015	.012
15. My project leader is persuasive.	.022	**.863**	.025	.019	.019	.029	.026

Items	Dimensions						
	1	2	3	4	5	6	7
16. My project leader is actively involved in the project.	.049	**.818**	.012	.032	.049	.023	.017
17. My project leader creates confidence.	.026	**.822**	.022	.032	.019	.033	.046
18. My project leader encourages team members in decision-making.	.016	**.877**	.012	.039	.012	.013	.031
19. My project leader promotes discussions.	.037	**.787**	.031	.034	.044	.033	.034
20. My project leader is caring.	.041	.031	**.770**	.041	.049	.032	.036
21. My project leader is empathetic.	.021	.034	**.819**	.031	.032	.016	.047
22. My project leader is understanding.	.040	.037	**.732**	.047	.049	.047	.048
23. My project leader is supportive.	.038	.047	**.742**	.042	.047	.045	.039
24. My project leader offers praise to members.	.038	.029	**.784**	.039	.034	.027	.049
25. My project leader gives adequate and timely feedback.	.049	.046	**.713**	.049	.045	.049	.049
26. My project leader is a visionary.	.017	.023	.039	**.716**	.019	.031	.115
27. My project leader inspires me.	.031	.047	.042	**.842**	.021	.006	.011
28. My project leader engages me.	.043	.032	.009	**.639**	.112	.030	.125
29. My project leader is focused.	.112	.013	.015	**.769**	.103	.023	.055
30. My project leader is committed.	.008	.014	.026	**.812**	.049	.006	.085
31. My project leader sets goals for the team.	.146	.016	.038	**.785**	.036	.004	.008
32. My project leader is able to lead people from diverse backgrounds.	.043	.021	.024	**.728**	.007	.023	.154
33. My project leader is results-driven.	.013	.039	.019	.039	**.789**	.052	.049
34. My project leader is a diligent monitor.	.019	.022	.021	.011	**.896**	.009	.022
35. My project leader is fully informed.	.032	.024	.016	.011	**.896**	.003	.018
36. My project leader is an advisor.	.025	.046	.047	.023	**.789**	.023	.047
37. My project leader provides adequate structures.	.024	.045	.021	.044	**.756**	.089	.021
38. My project leader gives clear task directions.	.035	.049	.024	.049	**.769**	.025	.049
39. My project leader observes and enquires where necessary.	.036	.047	.031	.047	**.776**	.033	.030
40. My project leader is a role model.	.023	.047	.031	.046	.032	**.789**	.032
41. My project leader is morally upright.	.039	.040	0.032	.047	.044	**.754**	.044
42. My project leader is honest.	.011	.024	.036	.010	.095	**.729**	.095
43. My project leader is creative.	.034	.055	.029	.047	.039	.040	**.756**
44. My project leader is dynamic.	.009	.039	.028	.033	.075	.056	**.760**
45. My project leader is flexible.	.041	.445	-.335	.006	.282	.045	**.516**
46. My project leader has good technical skills.	.028	.067	.056	.289	.009	.149	**.402**
47. My project leader is proactive.	.021	.041	.095	.272	.040	.069	**.462**
48. My project leader is sincere.	.232	-.423	.234	.411	.226	.061	**.259**
49. My project leader is innovative.	**.171**	.165	.123	0.163	.134	.126	.118
50. My project leader is spontaneous.	.041	.186	.142	**.205**	.116	.167	.143

Three items (48 My project leader is sincere [ethical tone setter]; 49 My project leader is innovative; and 50 My project leader is spontaneous [catalyst of possibilities]) share their loadings with other dimensions (see Table 9). These items also had loadings that were below the 0.30 threshold, and their commonality indexes were less than 0.20. Items that have loadings below 0.30 indicate that those

items do not meet the acceptable levels of explanation and are insufficient to adequately measure the dimension (Field, 2013; MacCallum et al., 1999; Nunnally, 1978; Raykov & Marcoulide, 2011; Tabachnick & Fidell, 2014). These items were deleted from the scale, and the Exploratory factor analysis (EFA) analysis was re-run. They were removed because such items were inadequate to measure a particular dimension, and they contributed <10% variation of the latent construct measured. Only items with loadings of 0.30 and above, and uniquely loaded on a factor, were retained (Nunnally, 1978; Raykov & Marcoulide, 2011) (see Table 9). Item 45 was kept because it had properly loaded on the dimension to which it belonged. Again, item 45 accounted for over 51% of the dimension, which was greater than the sum of all the other variances.

In total, three items were removed, leaving 47 items (see bold items in Table 9) with communalities greater than 0.2. The KMO statistic for this result was >0.70, and the correlation matrix determinant was >0.0001. The seven extracted dimensions accounted for more than 50% of the total variance in the data. These results indicated that the items retained uniquely measured their respective dimensions.

5.3.3 Step 3: Reliability Analysis

The internal consistency of the PLRI and its dimensions were measured using Cronbach's alpha values. According to Sekeran (2003), when the variable and its dimensions produce Cronbach's alpha values above 0.70, the variable and its dimensions are deemed reliable and acceptable for data collection. Tables 10 and 11 present the Cronbach's alpha values for the overall project leadership role instrument and the various dimensions that compose them.

5.3.3.1 Reliability Analysis for Overall Project Leadership Roles

Table 10
Reliability of the Overall Project Leadership Role Instrument Using Cronbach's Alpha

Variable	Cronbach's Alpha	Items	Valid Cases
Project Leadership Roles	0.97	47	72

As Table 10 indicates, the composite project leadership role instrument indicated a Cronbach's Alpha value of 0.97, which is above the 0.70 threshold recommended by Sekeran (2003). Thus, the scale is reliable and acceptable. This means that the composite project leadership role instrument is valid and sufficiently reliable to be administered to respondents for data collection purposes.

5.3.3.2 Reliability Analysis for Individual Project Leadership Role Dimensions

Table 11
Reliability of Individual Project Leadership Role Dimensions

Dimensions	Cronbach's Alpha	Items	Valid Cases
Direction Setter	0.84	7	72
Ethical Tone-Setter	0.79	3	72
Energiser and Mobiliser	0.83	8	72
Catalyst of Possibilities	0.78	5	72
Compassionate Anchor	0.84	6	72
Goal Orchestrator	0.78	7	72
Integrator	0.90	11	72

From Table 11, the direction setter (α = 0.84), ethical tone-setter (α = 0.79), energiser and mobiliser (α=0.83), catalyst of possibilities (α = 0.78), compassionate anchor (α = 0.84), goal orchestrator (α = 0.78) and integrator (α = 0.90) dimensions reported Cronbach alphas above the recommended threshold of 0.70. Therefore, they were deemed reliable per the recommendation of Sekeran (2003). The results showed that the various dimensions of the project leadership role construct were considered to have the internal consistency needed to collect data for measuring project leadership roles.

5.4 Pilot Study

Prior to the administration of the main survey, the measuring instruments (project complexity, project success, and transformational, transactional, and ethical leadership styles, and project leadership roles) were pre-tested on a different sample of 25 participants to assess the reliability (internal consistencies) of the instruments, in line with Kothari's (2004) recommendations. The Cronbach's alpha values computed for the measuring instruments are presented in Table 12. All the respective alpha values for the measuring instruments exceeded 0.7, which is a requirement for excellent construct reliability (Byrne, 2013; Hair et al., 2016). The participants who took part in the pilot study were excluded from the main survey.

Table 12
Reliability of the Measuring Instruments Using Cronbach's Alpha

Constructs	Existing Alpha Values	Pilot Alpha Values	Items
Project Complexity	0.86	0.94	12
Complexity by Fact	0.88	0.91	4
Complexity by Faith	0.85	0.89	4
Complexity by Interaction	0.73	0.87	4
Project Success	0.92	0.86	27
Transformational Leadership	0.92	0.91	19
Transactional Leadership	0.70	0.87	12
Ethical Leadership	0.94	0.92	10
Project Leadership Roles*	0.97	0.95	47

Note. **Instrument developed as part of the study.*

6. QUANTITATIVE RESULTS

6.1 Results of Main Survey

This section contains the results and analyses of the data collected on project complexity and its influence on project success, moderated by project leadership styles and roles from professionals working in Ghana's construction industry. It also presents the background information of the respondents, validation of the measurement instruments, and the results of the structural model (hypothesised relationships) and how the results of the hypothesised relationships address the research questions.

6.2 Response Rate

Out of the 350 copies of the questionnaire distributed to participants, 325 were returned, out of which 315 were usable, representing a response rate of 90%. The details are presented in Table 13.

Table 13
Response Rate

Category	Distributed	Received	Rejected	Usable	Response Rate
Contractor	150	125	8	117	78
Consultant	150	150	0	150	100
Other	50	50	2	48	96
All	**350**	**325**	**10**	**315**	**90**

6.3 Demographic Information

The demographic characteristics of the respondents are presented in Table 14. About a fifth (21.3%, N = 67) of the participants in the industry were women three quarters (75%, N = 236) of the respondents were between the ages of 20 and 40. Out of this percentage, 35% (N = 110) were between the ages of 20 and 30, indicating that the sample was dominated by young people. The construction sector as a science, technology, engineering and mathematical (STEM) sector is youthful and largely dominated by men in emerging economies. Concerning the distribution of sexes, most of the participants were men and were also youthful, which implies that the sample was representative of the population.

Over 90% (N = 280) of the respondents had either bachelor's or master's degrees suggesting that a significant number of them were educated. Most STEM-based sectors are highly specialised which requires extensive training and education. The sample indicated that most of the participants were well-educated and so adequately represented the population. Moreover, the high level of education implied that most of the participants could read and write and therefore could understand the relevant details of the research. About 17% (N = 54) of the respondents had between 11 and 20 years

of experience, and 12% (N = 37) had worked for over 20 years in the construction industry. This appeared to suggest that a significant number of the respondents were experienced. More than half, 56.5% (N = 178) of the respondents had worked on projects whose values were above $5 million, whereas the rest, 43.5% (N = 137), had worked on projects whose values were $5 million or less. Almost half, 47.6% (N = 150) of the participants were project management consultants; about 37.1% (N = 117) of them were contractors; and the rest, 15.3% (N = 48), were other professionals in the construction industry. The study required participants to share their experiences on projects. Most of the participants had had extensive experience and had been involved in multimillion dollar projects in the construction sector and could provide rich information to help in achieving the research goals.

Table 14
Demographic Background Information of the Respondents

Variables	Frequency (n)	Percentage (%)
Age Group		
20–30	110	34.9
31–40	126	40.0
41–50	52	16.5
51–60	15	4.8
Above 60	12	3.8
Sex		
Men	248	78.7
Women	67	21.3
Highest Academic Qualification		
Senior High School	3	1.0
Diploma/Higher National Diploma	23	7.3
Bachelor's	157	49.8
Master's	123	39.0
Other	9	2.9
Number of Years working in the Construction Industry		
Less Than One Year	48	15.2
1–10 Years	176	55.9
11–20 Years	54	17.1
21–30 Years	28	8.9
Above 30 Years	9	2.9
Value of Largest Project Worked on (US Dollars)		
200,000–1,000,000	58	18.4
1,000,001–3,000,000	35	11.1
3,000,001–5,000,000	44	14.0
5,000,000–7,000,000	39	12.4
7,000,001–9,000,000	23	7.3
Above 9,0000,000	116	36.8
Number of Projects Worked on		
1–5	135	42.9
6–-10	71	22.5
11–15	36	11.4
16–20	28	8.9
More Than 20	45	14.3
Role/Position		
Contractor	117	37.1
Consultant	150	47.6
Other	48	15.3
Total	315	100

6.4 Preliminary Data Analyses

The data screening processes were done using the procedures described in the next sections.

6.4.1 Assessment of Outliers

Outliers within data sets tend to affect the model fit information. To detect and resolve univariate outliers, standardised values (z-scores) for all the measurement items were generated, and the descriptive statistics were performed on the scores, as presented in Table 15 (Kline, 2005).

Outliers do not exist if the minimum and maximum values of the variables after transformation into z-scores are all within -3 and +3 (Kline, 2005). As depicted in Table 15, some variables had minimum and maximum values outside the recommended threshold, thus showing the possibility of their being outliers.

Table 15
Assessing Outliers Using Standardised Values of Items

Items	N	Minimum of Z-Score Value	Maximum of Z-Score	Items	N	Minimum of Z-Score Value	Maximum of Z-Score
ZFAITH1	315	-1.606	1.916	ZTSL6	315	-2.151	1.532
ZFAITH2	315	-1.591	2.103	ZTSL7	315	-2.033	1.515
ZFAITH3	315	-1.403	2.063	**ZTSL8**	**315**	**-0.900**	**16.309**
ZFAITH4	315	-1.506	1.973	ZTSL9	315	-1.012	2.053
ZFACT1	315	-1.520	2.040	ZTSL10	315	-0.756	2.356
ZFACT2	315	-1.260	2.456	ZTSL11	315	-1.097	1.948
ZFACT3	315	-1.139	2.413	ZTSL12	315	-0.694	3.063
ZFACT4	315	-1.379	2.354	ZET1	315	-2.761	0.956
ZFACT5	315	-1.249	2.157	ZET2	315	-3.446	1.209
ZINTER1	315	-1.534	2.764	ZET3	315	-3.076	1.158
ZINTER2	315	-1.464	2.107	ZET4	315	-3.015	1.219
ZINTER3	315	-1.369	2.053	ZET5	315	-2.985	1.157
ZINTER4	315	-1.417	1.968	ZET6	315	-2.947	1.080
ZPE1	315	-1.736	1.476	ZET7	315	-2.680	1.083
ZPE2	315	-1.854	1.577	ZET8	315	-3.620	1.138
ZPE3	315	-2.075	1.562	ZET9	315	-3.246	1.123
ZPE4	315	-2.750	1.326	ZET10	315	-3.055	1.144
ZEC1	315	-3.600	1.200	ZIG1	315	-3.197	2.126
ZEC2	315	-3.756	1.068	ZIG2	315	-2.956	2.181
ZEC3	**315**	**-1.781**	**15.853**	ZIG3	315	-3.344	2.614
ZEC4	315	-4.067	1.017	ZIG4	315	-3.728	2.420
ZEC5	**315**	**-3.564**	**5.527**	ZIG5	315	-2.829	1.197
ZETM1	315	-3.222	1.412	ZIG6	315	-3.685	1.281
ZETM2	315	-3.329	1.270	ZIG7	315	-3.850	1.198
ZETM3	315	-2.381	1.439	ZIG8	315	-3.002	1.306
ZETM4	315	-2.894	1.531	ZIG9	315	-2.991	1.326
ZETM5	315	-3.581	1.209	ZIG10	315	-2.705	1.426
ZETM6	315	-3.006	1.313	ZIG11	315	-3.785	1.485
ZBOS1	315	-3.732	1.470	ZEM1	315	-4.095	1.263
ZBOS2	315	-3.503	1.300	ZEM2	315	-4.024	1.280
ZBOS3	315	-3.642	1.308	ZEM3	315	-2.796	1.124
ZBOS4	315	-3.428	1.475	ZEM4	315	-2.304	1.148
ZBOS5	315	-3.448	1.412	ZEM5	315	-3.795	1.020
ZBOS6	315	-3.770	1.382	ZEM6	315	-3.517	1.148
ZPREF1	315	-3.794	2.304	ZEM7	315	-3.204	1.353

Items	N	Minimum of Z-Score Value	Maximum of Z-Score	Items	N	Minimum of Z-Score Value	Maximum of Z-Score
ZPREF2	315	-3.605	2.455	ZEM8	315	-3.701	1.250
ZPREF3	315	-3.697	2.544	ZCA1	315	-3.241	1.353
ZPREF4	315	-2.767	2.373	ZCA2	315	-2.780	1.288
ZPREF5	315	-3.380	2.602	**ZCA3**	**315**	**-1.000**	**16.994**
ZPREF6	315	-3.837	2.511	ZCA4	315	-3.461	1.289
ZTFL1	315	-1.958	1.267	ZCA5	315	-3.118	1.331
ZTFL2	315	-3.119	1.116	ZCA6	315	-3.248	1.269
ZTFL3	315	-2.881	1.086	ZDS1	315	-3.465	1.022
ZTFL4	**315**	**-1.179**	**15.901**	ZDS2	315	-3.124	1.068
ZTFL5	315	-2.746	1.263	ZDS3	315	-3.625	1.286
ZTFL6	315	-2.781	1.178	ZDS4	315	-2.831	1.080
ZTFL7	315	-3.094	1.040	ZDS5	315	-3.930	0.987
ZTFL8	315	-3.248	1.176	ZDS6	315	-4.120	1.050
ZTFL9	315	-3.429	1.119	ZDS7	315	-3.721	1.113
ZTFL10	315	-3.286	1.190	ZGO1	315	-4.207	1.068
ZTFL11	315	-3.191	1.109	ZGO2	315	-2.487	1.085
ZTFL12	315	-2.865	1.303	ZGO3	315	-4.167	1.240
ZTFL13	315	-2.964	1.232	ZGO4	315	-3.430	1.247
ZTFL14	315	-2.866	1.233	ZGO5	315	-3.787	1.417
ZTFL15	315	-3.128	1.346	ZGO6	315	-2.630	1.321
ZTFL16	315	-2.550	1.407	ZGO7	315	-3.909	1.276
ZTFL17	315	-2.308	1.425	ZES1	315	-3.321	1.061
ZTFL18	315	-2.228	1.330	ZES2	315	-2.998	1.081
ZTFL19	315	-2.711	1.346	ZES3	315	-3.755	1.189
ZTSL1	315	-2.327	1.486	ZCP1	315	-2.517	1.182
ZTSL2	315	-2.552	1.304	ZCP2	315	-2.346	1.241
ZTSL3	315	-2.100	1.447	ZCP3	315	-3.370	1.380
ZTSL4	315	-2.964	1.163	ZCP4	315	-4.304	1.049
ZTSL5	315	-2.094	1.333	ZCP5	315	-3.781	0.983

Note. *Variables with minimum and maximum values outside the recommended threshold in bold*

6.4.2 Normality Test

Further exploration of the data, using graphical methods such as box plots, confirmed the presence of some outliers. To determine if such observed outliers were potentially problematic, skewness and kurtosis of each variable were assessed, as shown in Table 16. Skewness and kurtosis values were calculated for each variable transformed into z-score formats to determine if the variables assumed an approximately normal distribution. Skewness and kurtosis values within -2 to +2 are generally considered as acceptable for normal distribution (Byrne, 2013; Hair et al., 2005; Hair et al., 2010). The normality results are presented in Table 16.

Table 16

Assessing Normality of Data Using Skewness and Kurtosis Values of Items

Items	Mean	Skewness	Kurtosis	Items	Mean	Skewness	Kurtosis
ZFAITH1	0	0.148	-0.766	ZTSL6	0	-0.385	-0.486
ZFAITH2	0	0.073	-1.022	ZTSL7	0	-0.258	-0.653
ZFAITH3	0	0.262	-0.994	**ZTSL8**	0	**13.859**	**226.699**
ZFAITH4	0	0.174	-0.928	ZTSL9	0	0.454	-1.055
ZFACT1	0	0.196	-0.954	ZTSL10	0	0.995	-0.384
ZFACT2	0	0.624	-0.512	ZTSL11	0	0.315	-1.121
ZFACT3	0	0.599	-0.719	ZTSL12	0	1.136	-0.073
ZFACT4	0	0.534	-0.753	ZET1	0	-1.225	0.827
ZFACT5	0	0.393	-1.026	ZET2	0	-0.893	0.691
ZINTER1	0	0.357	-0.487	ZET3	0	-1.167	1.056
ZINTER2	0	0.414	-0.841	ZET4	0	-0.695	-0.256
ZINTER3	0	0.273	-0.996	ZET5	0	-0.832	-0.004
ZINTER4	0	0.278	-0.982	ZET6	0	-0.987	0.639
ZPE1	0	-0.240	-1.089	ZET7	0	-0.824	-0.370
ZPE2	0	-0.258	-0.909	ZET8	0	-0.939	0.409
ZPE3	0	-0.419	-0.798	ZET9	0	-0.909	0.254
ZPE4	0	-0.810	0.526	ZET10	0	-0.899	0.292
ZEC1	0	-0.565	0.136	ZIG1	0	-0.888	0.942
ZEC2	0	-0.857	0.575	ZIG2	0	-0.787	0.154
ZEC3	0	**12.667**	**202.136**	ZIG3	0	-0.402	0.146
ZEC4	0	-0.764	0.331	ZIG4	0	-0.738	1.026
ZEC5	0	**-0.242**	**3.066**	ZIG5	0	-0.363	-0.565
ZETM1	0	-0.518	0.165	ZIG6	0	-0.863	1.268
ZETM2	0	-0.701	0.561	ZIG7	0	-0.709	0.933
ZETM3	0	-0.203	-0.509	ZIG8	0	-0.909	1.239
ZETM4	0	-0.337	-0.179	ZIG9	0	-0.884	1.200
ZETM5	0	-0.676	0.243	ZIG10	0	-0.276	-0.169
ZETM6	0	-0.454	-0.262	ZIG11	0	-0.399	0.460
ZBOS1	0	-0.492	1.016	ZEM1	0	-0.555	0.453
ZBOS2	0	-0.476	0.065	ZEM2	0	-0.596	0.792
ZBOS3	0	-0.515	0.465	ZEM3	0	-0.457	-0.529
ZBOS4	0	-0.071	-0.538	ZEM4	0	-0.999	0.348
ZBOS5	0	-0.209	-0.258	ZEM5	0	-0.795	0.272
ZBOS6	0	-0.530	0.564	ZEM6	0	-0.945	1.307
ZPREF1	0	-0.557	-0.085	ZEM7	0	-0.763	0.826
ZPREF2	0	-0.432	0.427	ZEM8	0	-0.712	0.875
ZPREF3	0	-0.342	0.090	ZCA1	0	-0.754	1.016
ZPREF4	0	-0.290	-0.098	ZCA2	0	-0.759	0.439
ZPREF5	0	-0.156	0.247	**ZCA3**	0	**15.699**	**267.740**
ZPREF6	0	-0.590	0.903	ZCA4	0	-0.899	1.629
ZTFL1	0	-0.646	-0.366	ZCA5	0	-0.634	0.595
ZTFL2	0	-0.919	0.871	ZCA6	0	-0.836	1.062
ZTFL3	0	-0.709	-0.080	ZDS1	0	-0.881	0.783
ZTFL4	0	**12.796**	**204.608**	ZDS2	0	-0.869	0.603
ZTFL5	0	-0.446	-0.588	ZDS3	0	-0.589	0.212
ZTFL6	0	-0.599	-0.316	ZDS4	0	-0.558	-0.337
ZTFL7	0	-0.858	0.214	ZDS5	0	-0.947	0.948
ZTFL8	0	-0.551	-0.215	ZDS6	0	-0.794	0.822
ZTFL9	0	-0.879	0.825	ZDS7	0	-0.692	0.347
ZTFL10	0	-0.414	-0.552	ZGO1	0	-0.554	-0.146
ZTFL11	0	-0.797	0.323	ZGO2	0	-0.624	-0.273
ZTFL12	0	-0.393	-0.297	ZGO3	0	-0.465	0.161
ZTFL13	0	-0.488	-0.174	ZGO4	0	-0.948	1.753
ZTFL14	0	-0.721	0.435	ZGO5	0	-0.524	0.401
ZTFL15	0	-0.369	-0.456	ZGO6	0	-0.258	-0.562
ZTFL16	0	-0.232	-0.662	ZGO7	0	-0.697	0.938
ZTFL17	0	-0.453	-0.408	ZES1	0	-0.670	0.077

Items	Mean	Skewness	Kurtosis		Items	Mean	Skewness	Kurtosis
ZTFL18	0	-0.466	-0.340		ZES2	0	-0.695	0.115
ZTFL19	0	-0.630	0.147		ZES3	0	-0.687	0.558
ZTSL1	0	-0.343	-0.314		ZCP1	0	-0.436	-0.500
ZTSL2	0	-0.253	-0.684		ZCP2	0	-0.224	-0.905
ZTSL3	0	-0.239	-0.683		ZCP3	0	-0.523	0.149
ZTSL4	0	-0.546	-0.554		ZCP4	0	-0.881	1.338
ZTSL5	0	-0.452	-0.558		ZCP5	0	-0.859	0.660

Note. *Variables with skewness and kurtosis values in bold show a violation of normal distribution*

According to Table 16, all the skewness and kurtosis for the z-score values were within -2 and +2, except for five variables, showing that multivariate normality of data may be assumed (Byrne, 2013; Hair et al., 2005). The five variables, however, were problematic and highly skewed. They included ZEC3 (The products met customers' requirements), ZEC5 (The customers will come back for future work), ZTFL4 (Displays a sense of power and confidence), ZTSL8 (Directs my attention toward failure to meet standards), and ZCA3 (My project leader is understanding). These five items were, therefore, eliminated before further analyses of data.

6.5 Structural Equation Modelling

Structural equation modelling (SEM) was used to test the study's conceptual model. To perform the structural equation modelling, it is necessary to assess the measurement and structural models (Hair et al., 2014; Hair et al., 2016; Lings & Greenly, 2010). Assessment of the measurement model is called confirmatory factor analysis for reflective constructs, whereas the structural model is for hypotheses testing.

6.5.1 Measurement Model Analysis or Confirmatory Factor Analysis

To validate the various scales in the study's conceptual model, confirmatory factor analysis (CFA) was conducted for the project complexity scale, project success scale, transformational leadership scale, transactional leadership scale, ethical leadership scale, and project leadership roles scale. During the CFA, model fit indices, convergent validity, and reliability were assessed. The CFA path diagrams showing item loadings are presented in Figures 4 to 9. Similarly, Tables 17 to 6.13 show the CFA fit indices, item loadings, t-values, Cronbach's alphas, composite reliabilities, and average variance extracted (AVEs) estimates.

Several authors have suggested $\chi 2/df$ ratio < 5, RMSEA < 0.08, CFI > 0.90, TLI > 0.90, AGFI > 0.80 and SRMR < 0.08 as excellent model fit indices and information (Byrne, 2010; Hu & Bentler, 1999). Also, to obtain adequate convergent validity, several authors have suggested composite reliabilities (C.Rs) higher than 0.70 and average variance extracted estimates of 0.50 or higher (Byrne, 2010; Fornell & Larcker, 1981; Hair et al., 2016; Hu & Bentler, 1999). Nonetheless, Fornell and Larcker (1981) further

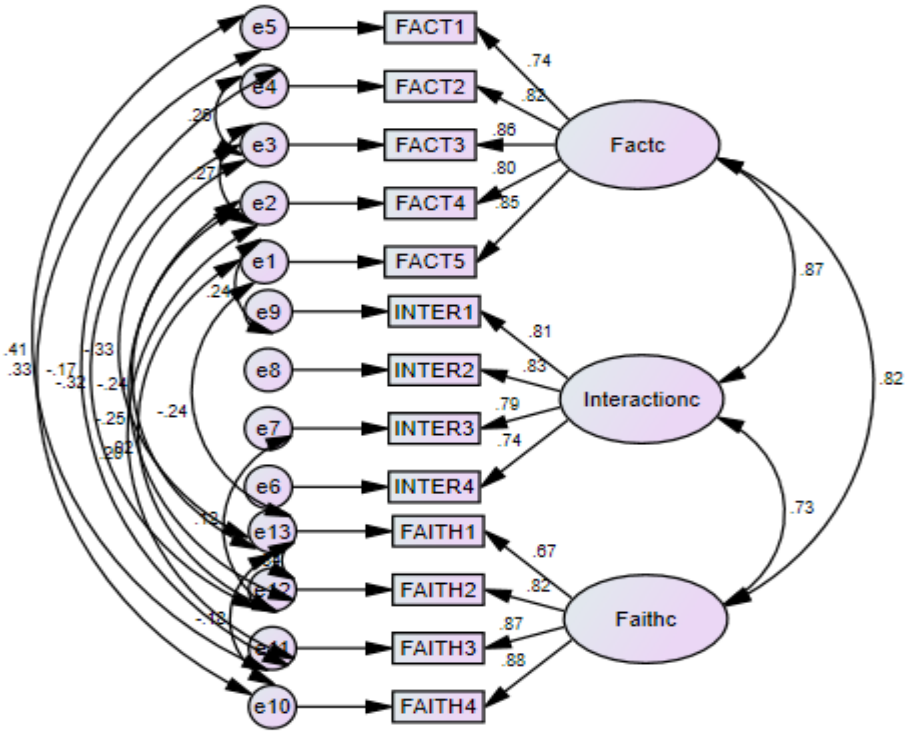
argued that convergent validity is still adequate if AVE is less than 0.50, provided that the composite reliability is above 0.60. Borsboom et al. (2004) further explained that once the measurement scale has excellent model fit indices, low AVEs have negligible effect since measurement error is considered in estimating model fit indices. Also, to obtain adequate reliability, Cronbach's alpha coefficient should be above 0.60 for exploratory studies (Hair et al., 2009, 2016).

6.5.1.1 Confirmatory Factor Analysis of Project Complexity

The project complexity scale was subjected to CFA using Amos Version 20 (Byrne, 2013). Initially, the model had poor fit indices. To improve the model fit, the modification indices suggested setting the error covariance between some of the variables to zero. The model was revised by drawing error covariance matrices between the suggested items (e.g., between "FACT2" and "FACT3"). The revised model and its fit indices are presented in Figure 4 and Table 17.

Figure 4

Project Complexity Confirmatory Factor Analysis Path Diagram Showing Standardised Coefficients and Item Loadings



Note. *Factc = complexity by fact; Interactionc = complexity by interaction; Faithc = complexity by faith.*

Table 17

Measurement Validity and Reliability Assessment Results for Project Complexity

Construct	α	CR	AVE	T-Values	Loading
Project Complexity					
Fact	0.913	0.908	0.664		
1. I experience complexities owing to a project's uniqueness (e.g., new client, new technology).				15.449	0.743
2. The amount of information to be processed on a project poses difficulties for me.				17.74	0.823
3. The number of people and organisations involved on a project poses difficulties for me.				18.72	0.856
4. I encounter complexities as a result of the interdependency of technology, people, and organisations on a project.				16.94	0.799
5.The characteristics of a project, such as size, poses difficulties for me.				Fixed	0.849
Interaction	0.871	0.872	0.631		
1. Depending on the level of locality or internationality of a project, I encounter difficulties.				14.18	0.811
2. The multidisciplinary level and nature of a project poses difficulties.				14.59	0.835
3. The degree of transparency of information required on a project results in complexities for me.				13.76	0.788
4. I encounter difficulties as a result of empathy with the various stakeholders on a project.				Fixed	0.740
Faith	0.891	0.888	0.667		
1. When a project requires new methods and ideas that are not widely known, I encounter difficulties.				12.538	0.675
2. The number of changes made to the technical scope of a project poses difficulties for me.				18.522	0.817
3. I encounter difficulties associated with the effect of technical changes on the project.				20.796	0.872
4. I encounter difficulties associated with the effect of scope changes on the project.				Fixed	0.885

Fit Statistics	Chi-Square	df	RMSEA	TLI	CFI	SRMR
Project complexity	64.39	46	0.036	0.99	0.994	0.072

Notes. *CR – composite reliability; α – Cronbach's alpha; AVE – average variance extracted; DF – degree of freedom; RMSEA – root mean square error of approximation; TLI – Tucker-Lewis Index; CFI – comparative fit index; SRMR – standardised root mean square residual. Standardised estimates were reported.*

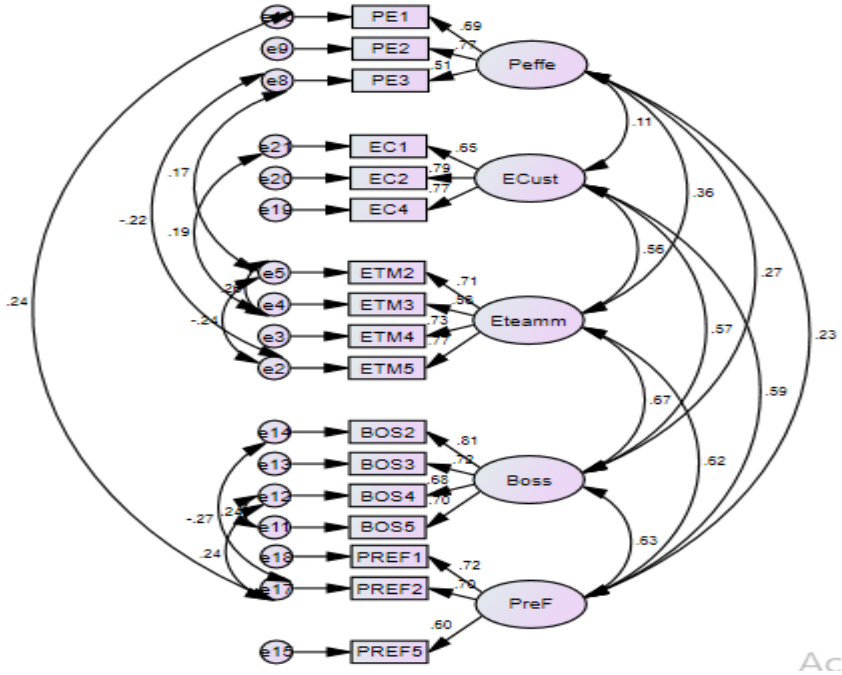
The revised model showed excellent fit indices (χ^2 = 64.39, df= 46, CFI = 0.99, RMSEA = 0.036, SRMR = 0.072). Furthermore, all the item loadings were statistically significant ($p < 0.01$). All the AVE estimates were higher than 0.50; therefore, convergent validity has been adequately established. The model demonstrates adequate reliability since all the three dimensions had composite reliability and Cronbach's alpha values above 0.70. Thus, the project complexity scale demonstrates adequate reliability and convergent validity. The construct of project complexity was assessed as a total construct, and it was always treated as consisting of three dimensions. The items included in the total construct was never treated as contributing directly to a unidimensional construct. The analyses confirmed project complexity as a three-dimensional construct.

6.5.1.2 Confirmatory Factor Analysis of Project Success Measure

The CFA results of the final project success model are presented in Figure 5 and Table 18. The model showed acceptable fit indices (χ^2 = 228.9, df = 100, CFI = 0.94, RMSEA = 0.064, SRMR = 0.045). Furthermore, all the item loadings were statistically significant ($p < 0.01$). The average variance extracted estimates for three out of the five project success dimensions, specifically project efficiency, team impact, and preparing for the future, had AVEs marginally below 0.50. However, in line with Fornell and Larcker's (1981) recommendations, all the dimensions demonstrated adequate convergent validity since their corresponding composite reliabilities were all above 0.60. Additionally, the model demonstrated adequate reliability since all five project success dimensions had composite reliability values and Cronbach's alphas above 0.70. As such, the project success scale demonstrates adequate reliability and convergent validity.

Figure 5

Project Success – Confirmatory Factor Analysis Path Diagram Showing Standardised Coefficients and Item Loadings



Note. *Peffe = Project efficiency; Ecust = impact on customer; Eteamm = impact on team; Boss = Business and organisation success; Pref = Preparation for future.*

Table 18

Measurement Validity and Reliability Assessment Results for Project Success

Construct	α	CR	AVE	T-Values	Loading
Project Success (α = 0.859)					
Project Efficiency	0.700	0.700	0.444		
1. Projects were completed on time or earlier.				7.214	0.690
2. Projects were completed within or below budget.				7.06	0.771
3. Other efficiency measures were achieved.				Fixed	0.511
Impact on Customer	0.778	0.783	0.548		
1. Projects improved the customer's performance.				10.477	0.651
2. The customers were satisfied.				11.98	0.792
3. The customers are using the project.				Fixed	0.77
Impact on Team	0.792	0.791	0.489		
1. The teams were highly loyal to the projects.				10.336	0.708
2. The project teams had high morale and energy.				9.186	0.582
3. The teams felt that working on the projects was fun.				11.215	0.728
4. Team members experienced personal growth.				Fixed	0.77
Direct Business and Organisational Success	0.830	0.819	0.532		
1. The projects increased the organisation's profitability.				11.928	0.813
2. The projects had positive returns on investment.				11.02	0.716
3. The projects increased the organisation's market share.				12.28	0.678
4. The projects contributed to shareholders' value.				Fixed	0.702
Preparing for the Future	0.713	0.711	0.452		
1. Project outcomes will contribute to future projects.				8.806	0.716
2. The projects will lead to additional new products.				8.65	0.698
3. The projects contributed to new business processes.				Fixed	0.598

Fit Statistics	**Chi-square**	**df**	**RMSEA**	**TLI**	**CFI**	**SRMR**
Project Success	228.972	100	0.064	0.912	0.935	0.045

Notes. *CR – composite reliability; α – Cronbach's alpha; AVE – average variance extracted; DF – degree of freedom; RMSEA - root mean square error of approximation; TLI – Tucker-Lewis index; CFI – comparative fit index; SRMR – standardized root mean square residual. Standardised estimates were reported.*

6.5.1.3 Confirmatory Factor Analysis of Leadership Styles and Approaches

Confirmatory factor analysis was conducted for each of the three leadership styles (transformational, transactional, and ethical leadership). The CFA results of the final models are presented in Figures 6 to 7. The models showed acceptable fit indices: transformational leadership (χ^2 = 164.33, df = 103, CFI = 0.97, RMSEA = 0.044, SRMR = 0.038), transactional leadership (χ^2 = 1.35, df = 1, CFI = 1.00, RMSEA = 0.033, SRMR = 0.016), and ethical leadership (χ^2 = 42.43, df = 25, CFI = 0.99, RMSEA = 0.047, SRMR = 0.051).

i. Transformational Leadership

Furthermore, following similar arguments on the adequacy of convergent validity and reliability, Table 19 shows that the transformational leadership scale demonstrates adequate reliability and validity (Fornell & Larcker, 1981; Borsboom et al., 2004; Hair et al., 2009, 2016).

Figure 6

Transformational Leadership – CFA Path Diagram Showing Standardised Coefficients and Item Loadings

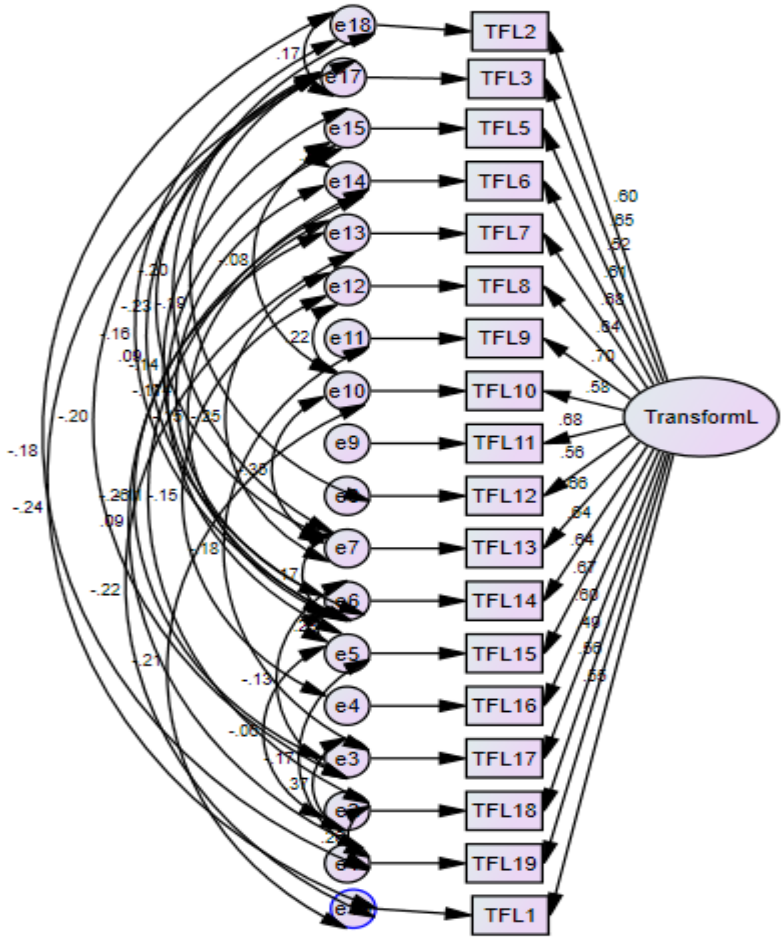


Table 19

Measurement Validity and Reliability Assessment Results – Transformational Leadership

Construct	α	CR	AVE	T- Values	Loading
Transformational Leadership	0.910	0.916	0.40		
1. Instils pride in me for being associated with him/her				7.946	0.546
2. Goes beyond self-interest for the good of the group				7.838	0.600
3. Acts in ways that build my respect				8.884	0.649
4. Talks about his/her most important values and beliefs				7.741	0.522
5. Specifies the importance of having a strong sense of decisions				9.032	0.606
6. Emphasises the importance of having a collective sense of mission				9.258	0.678
7. Talks optimistically about the future				8.905	0.639
8. Talks enthusiastically about what needs to be accomplished				9.508	0.704
9. Expresses a compelling vision of the future				8.320	0.581
10. Expresses confidence that goals will be achieved				9.351	0.683
11. Re-examines critical assumptions to question whether they are appropriate or not				8.168	0.561
12. Seeks differing perspectives when solving problems				9.074	0.664
13. Gets me to look at problems from many different angles				8.799	0.643
14. Suggests new ways of looking at how to complete assignments				8.336	0.644
15. Spends time teaching and coaching				9.267	0.674
16. Treats me as an individual rather than just a member of a team				8.500	0.600
17. Considers me as having different needs, abilities, and aspirations from others				8.468	0.487
18. Helps me to develop my strengths				Fixed	0.556

Fit Statistics	**Chi-Square**	**df**	**RMSEA**	**TLI**	**CFI**	**SRMR**
Transformational Leadership	164.328	103	0.044	0.96	0.973	0.038

Notes: *CR – composite reliability; α – Cronbach's alpha: AVE – average variance extracted; DF – degree of freedom; RMSEA – root mean square error of approximation; TLI – Tucker-Lewis index; CFI – comparative fit index; SRMR – standardised root mean square residual. Standardised estimates were reported.*

ii. Transactional Leadership

Confirmatory factor analysis was conducted for the transactional leadership style. The CFA results of the final model are presented in Figure 7 and Table 20. The model showed acceptable fit indices ($\chi 2$ = 1.347, df = 1, CFI = 0.99, RMSEA = 0.033, SRMR = 0.016). Furthermore, following similar arguments on the adequacy of convergent validity and reliability, Table 20 shows that the transactional leadership scale demonstrates adequate reliability and validity (Borsboom et al., 2004; Fornell & Larcker, 1981; Hair et al., 2009, 2016).

Figure 7

Transactional Leadership – Confirmatory Factor Analysis Path Diagram Showing Standardised Coefficients and Item Loadings

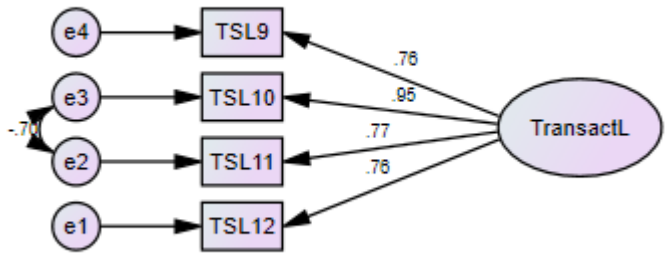


Table 20

Measurement Validity and Reliability Assessment Results – Transactional Leadership

Construct	α	CR	AVE	T-Values	Loading
Transactional Leadership	0.873	0.887	0.664		
1 Desists from interfering until problems become serious				14.361	0.756
2. Waits for things to go wrong before taking action				14.848	0.952
3. Shows that he/she is a firm believer in "if it ain't broke, don't fix it"				11.925	0.773
4. Demonstrates that problems must become chronic before taking action				Fixed	0.761

Fit Statistics	Chi-Square	df	RMSEA	TLI	CFI	SRMR
Transactional Leadership	1.347	1	0.033	0.997	0.999	0.016

Notes. *CR - composite reliability, α - Cronbach's alpha, AVE - Average variance extracted, DF - Degree of freedom, RMSEA - Root mean square error of approximation, TLI - Tucker-Lewis Index, CFI - Comparative fit index, SRMR - Standardized root mean square residual, Standardized estimates were reported*

iii. Ethical Leadership

Confirmatory factor analysis was conducted for the ethical leadership style. The CFA results of the final model are presented in Figure 8 and Table 21. The models showed acceptable fit indices (χ^2 = 42.43, df = 25, CFI = 0.99, RMSEA = 0.047, SRMR = 0.051). Furthermore, following similar arguments on the adequacy of convergent validity and reliability, Table 21 shows that the ethical leadership scale demonstrates adequate reliability and validity (Borsboom et al., 2004; Fornell & Larcker, 1981; Hair et al., 2009, 2016).

Figure 8

Ethical Leadership – Confirmatory Factor Analysis Path Diagram Showing Standardised Coefficients and Item Loadings

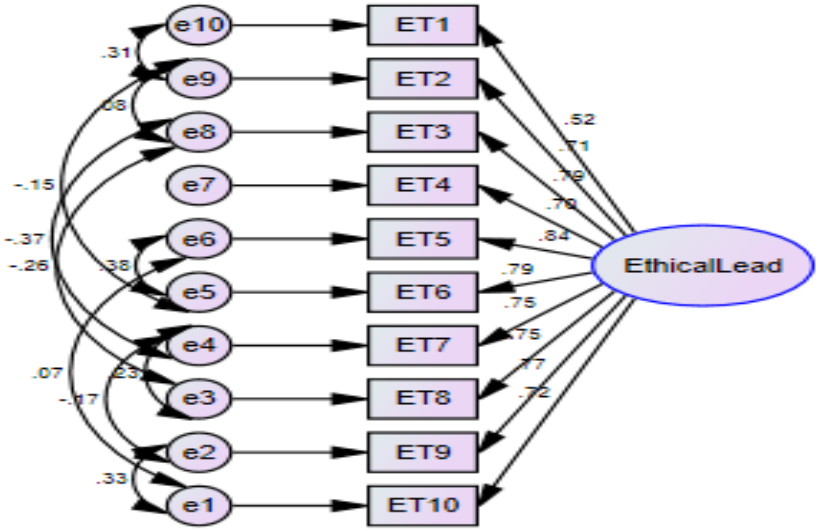


Table 21

Measurement Validity and Reliability Assessment Results – Ethical Leadership

Construct	α	CR	AVE	T- Values	Loading
Ethical Leadership	0.920	0.921	0.543		
1. Conducts his/her personal life in an ethical manner				8.827	0.517
2. Defines success not just by results but also by the way they are obtained				11.878	0.706
3. Listens to what employees have to say				13.069	0.788
4. Disciplines employees who violate ethical standards				11.984	0.701
5. Makes fair and balanced decisions				14.784	0.838
6. Can be trusted				13.435	0.790
7. Discusses business ethics or values with employees				12.392	0.747
8. Sets an example of how to do things the right way in terms of ethics				12.577	0.753
9. Has the best interests of employees in mind				15.863	0.767
10. When making decisions, asks "What is the right thing to do?"				Fixed	0.715
Fit Statistics	**Chi-Square**	**df**	**RMSEA**	**TLI**	**CFI**	**SRMR**
Ethical Leadership	42.431	25	0.047	0.984	0.991	0.051

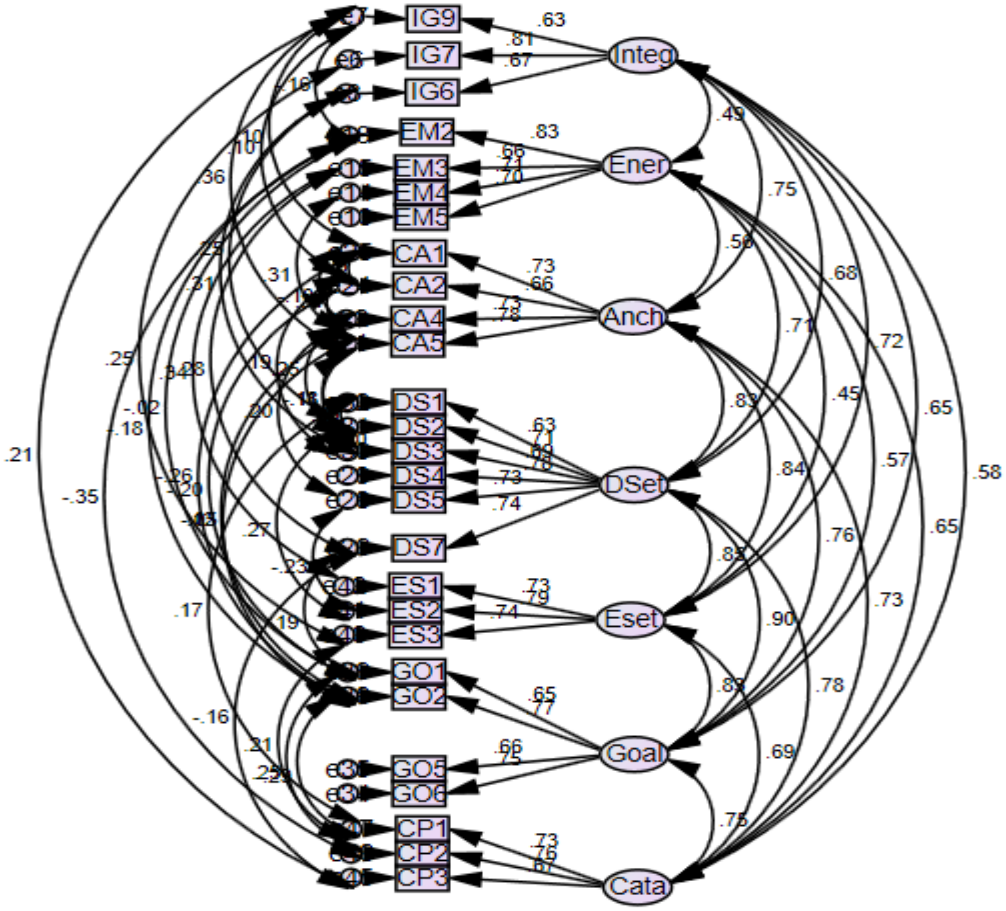
Notes. *CR - composite reliability, α - Cronbach's alpha, AVE - Average variance extracted, DF - Degree of freedom, RMSEA - Root mean square error of approximation, TLI - Tucker-Lewis Index, CFI - Comparative fit index, SRMR - Standardized root mean square residual, "Standardized estimates" were reported.*

6.5.1.4 Confirmatory Factor Analysis of Project Leadership Role Instrument

The CFA results of the final model are presented in Figure 8. The model showed excellent fit indices (χ^2 = 664.93, df = 267, CFI = 0.92, RMSEA = 0.069, SRMR = 0.042). The reliability and convergent validity of the various types of project leadership roles are explained.

Figure 9

Project Leadership Roles – Confirmatory Factor Analysis Path Diagram Showing Standardised Coefficients and Item Loadings



Note. *Integ = integrator; Ener = energiser mobiliser; Anch = compassionate anchor; DSet = direction setter; Eset = ethical tone-setter; Goal = goal orchestrator; Cata = catalyst of possibilities*

iv. Direction Setter

The direction setter construct had a Cronbach's alpha of 0.862, composite reliability of 0.862, and AVE of 0.510 – all higher than the recommended thresholds for convergent validity (Byrne, 2013; Hair et al., 2016). Furthermore, all the item loadings were statistically significant ($p < 0.01$). Therefore, the direction setter construct demonstrated adequate reliability and convergent validity. See Table 22.

Table 22
Measurement Validity and Reliability Assessment Results – Direction Setter

Construct	α	CR	AVE	T-Values	Loading
Direction Setter	0.862	0.862	0.510		
1. My project leader is a visionary.				11.046	0.626
2. My project leader inspires me.				12.758	0.711
3. My project leader engages me.				12.401	0.691
4. My project leader is focused.				13.992	0.777
5. My project leader is committed.				13.05	0.729
6. My project leader is able to lead people from diverse backgrounds.				Fixed	0.743

v. Ethical Tone-Setter

The ethical tone-setter construct had a Cronbach's alpha of 0.793, composite reliability of 0.796, and AVE of 0.565 – all higher than the recommended thresholds for convergent validity (Byrne, 2013; Hair et al., 2016). Furthermore, all the item loadings were statistically significant ($p<0.01$). Therefore, the ethical setter construct demonstrated adequate reliability and convergent validity. See Table 23.

Table 23
Measurement Validity and Reliability Assessment Results – Ethical Setter

Construct	α	CR	AVE	T-Values	Loading
Ethical Setter	0.793	0.796	0.565		
1. My project leader is a role model.				12.556	0.728
2. My project leader is morally upright.				13.41	0.791
3. My project leader is honest.				Fixed	0.735

vi. Energiser and Mobiliser

The energiser and mobiliser construct had a Cronbach's alpha of 0.800, composite reliability of 0.817, and AVE of 0.530 – all higher than the recommended thresholds for convergent validity (Byrne, 2013; Hair et al., 2016). Furthermore, all the item loadings were statistically significant ($p<0.01$). Therefore, the energiser and mobiliser construct demonstrated adequate reliability and convergent validity. See Table 24.

Table 24
Measurement Validity and Reliability Assessment Results – Energiser and Mobiliser

Construct	α	CR	AVE	T-Values	Loading
Energiser and Mobiliser	0.800	0.817	0.530		
1. My project leader is energetic.				12.975	0.829
2. My project leader is often excited about projects.				10.888	0.659
3. My project leader is persuasive.				11.514	0.709
4. My project leader is actively involved in the project.				Fixed	0.704

vii. Catalyst of Possibilities

The catalyst of possibilities construct had a Cronbach's alpha of 0.762, composite reliability of 0.762, and AVE of 0.517 – all higher than the recommended thresholds for convergent validity (Byrne, 2013; Hair et al., 2016). Furthermore, all the item loadings were statistically significant ($p < 0.01$). Therefore, the catalyst of possibilities construct demonstrated adequate reliability and convergent validity. See Table 25.

Table 25
Measurement Validity and Reliability Assessment Results – Catalyst of Possibilities

Construct	α	CR	AVE	T-Values	Loading
Catalyst of Possibilities	0.762	0.762	0.517		
1. My project leader is creative.				10.787	0.729
2. My project leader is dynamic.				11.113	0.759
3. My project leader is flexible.				Fixed	0.665

viii. Compassionate Anchor

The compassionate anchor construct had a Cronbach's alpha of 0.842, composite reliability of 0.816, and AVE of 0.527 – all higher than the recommended thresholds for convergent validity (Byrne, 2013; Hair et al., 2016). Furthermore, all the item loadings were statistically significant ($p < 0.01$). Therefore, the compassionate anchor construct demonstrated adequate reliability and convergent validity. See Table 26.

Table 26
Measurement Validity and Reliability Assessment Results – Compassionate Anchor

Construct	α	CR	AVE	T-Values	Loading
Compassionate Anchor	0.842	0.816	0.527		
1. My project leader is caring.				12.526	0.726
2. My project leader is empathetic.				11.317	0.664
3. My project leader is supportive.				12.718	0.731
4. My project leader praises members.				Fixed	0.779

ix. Goal Orchestrator

The goal orchestrator construct had a Cronbach's alpha of 0.805, composite reliability of 0.802, and AVE of 0.505 – all higher than the recommended thresholds for convergent validity (Byrne, 2013; Hair et al., 2016). Furthermore, all the item loadings were statistically significant ($p < 0.01$). Therefore, the goal orchestrator construct demonstrated adequate reliability and convergent validity. See Table 27.

Table 27
Measurement Validity and Reliability Assessment Results – Goal Orchestrator

Construct	α	CR	AVE	T-Values	Loading
Goal Orchestrator	0.805	0.802	0.505		
1. My project leader is results-driven.				11.306	0.655
2. My project leader is a diligent monitor.				13.423	0.775
3. My project leader provides adequate structures.				11.323	0.658
4. My project leader gives clear task direction.				Fixed	0.747

x. Integrator

The integrator construct had a Cronbach's alpha of 0.745, composite reliability of 0.749, and AVE of 0.501 – all higher than the recommended thresholds for convergent validity (Byrne, 2013; Hair et al., 2016). Furthermore, all the item loadings were statistically significant ($p < 0.01$). Therefore, the integrator construct demonstrated adequate reliability and convergent validity. See Table 28.

Table 28
Measurement Validity and Reliability Assessment Results – Integrator

Construct	α	CR	AVE	T-Values	Loading
Integrator	0.745	0.749	0.501		
1. My project leader resolves conflicts.				9.516	0.667
2. My project leader collaborates to create strong relationships.				10.516	0.810
3. My project leader establishes various channels of interactions				Fixed	0.635

6.5.1.5 Discriminant Validity of the Project Leadership Roles Dimensions

Discriminant validity was specifically assessed for the dimensions of the project leadership role instrument (Table 29), as it is a newly developed scale. The other scales used in the research are well-established scales. However, the analysis provided model fit criteria and convergent validity (Borsboom et al., 2004) of the scales. In Table 29, the square root of the average variance extracted estimates, shown diagonally in bold, are all higher than the inter-construct correlations; therefore, discriminant validity was adequately established.

Table 29
Discriminant Validity (Fornell-Larcker Criterion)

	1	2	3	4	5	6	7
1. Direction Setter	**0.714**						
2. Ethical Setter	0.687	**0.752**					
3. Energiser and Mobiliser	0.568	0.356	**0.728**				
4. Catalyst of Possibilities	0.62	0.549	0.494	**0.719**			
5. Compassionate Anchor	0.684	0.648	0.487	0.586	**0.726**		
6. Goal Orchestrator	0.691	0.656	0.464	0.585	0.55	**0.711**	
7. Integrator	0.572	0.568	0.404	0.482	0.63	0.499	**0.708**

Note. *Square root of AVEs in diagonal bold. All the correlations are significant ($p < 0.01$).*

6.5.1.6 Correlation Matrix

In line with recommendations by Hair et al. (2006), composite scores for all the latent variables were obtained by averaging the ratings for items under the latent variables. These scores were used for subsequent analyses. This section examines the Pearson correlation between the composite project complexity, leadership styles (transformational, transactional, and ethical), the dimensions of project leadership roles, and the composite project success, as shown in Table 30. In Table 30, all correlation results are between low to moderate, showing that multicollinearity was absent from the data. The low to moderate correlations are further evidence of the fact that discriminant validity has been met (Gerbing & Anderson, 1988). The overall correlation matrix presented in Table 30 demonstrates the uniqueness of the constructs. From the results in Table 30, it can be observed that overall project complexity had a negative but insignificant effect on overall project success. The relationship between transformational leadership and transactional leadership was negative but insignificant. Transformational leadership, however, had a significant positive effect on ethical leadership. However, transactional leadership had a significant negative effect on ethical leadership, indicating that ethical leaders are less likely to adopt a carrot and stick approach in managing people but there was a significantly positive correlation between transactional leadership and overall project complexity.

Both transformational leadership and ethical leadership had a significant positive effect on all the project leadership roles dimensions, namely: direction setter, ethical tone setter, energiser and mobiliser, catalyst of possibilities, compassionate anchor, goal orchestrator, and integrator.

With the exception of project complexity and transactional leadership, all the other parameters including transformational leadership, ethical leadership, and project leadership roles dimensions had significant positive effects on overall project success. Further, a positive a significant relationship exists among all the seven project leadership roles dimensions.

Table 30

Correlation Matrix of the Latent Constructs of Project Complexity, Leadership Styles, Roles, and Project Success

	1	2	3	4	5	6	7	8	9	10	11	12
1. Project Complexity	1.00											
2. Transformational Leadership	-0.04 (0.54)	1.00										
3. Transactional Leadership	0.22***	-0.02)	1.00									
4. Ethical Leadership	0.02	0.61***	-0.12*	1.00								
5. Direction Setter	-0.03	0.52***)	-0.12*	0.64***	1.00							
6. Ethical Setter	0.04	0.40***	-0.14*	0.60***	0.69***	1.00						
7. Energiser and Mobiliser	-0.16**	0.51***)	-0.04	0.45***	0.57***	0.35***	1.00					
8. Catalyst of Possibilities	-0.04	0.47***	0.01	0.50***	0.62***	0.55***	0.49***	1.00				
9. Compassionate Anchor	0.04)	0.49***	0.05	0.59***	0.68***	0.65***	0.49***	0.59***	1.00			
10. Goal Orchestrator	-0.07	0.41***	-0.14*)	0.54***	0.69***	0.66***	0.46***	0.59***	0.55***	1.00		
11. Integrator	-0.01	0.45***	0.08	0.47***	0.57***	0.57***	0.40***	0.48***	0.63***	0.50***	1.00	
12. Project Success	-0.07	0.51***	0.04	0.43***	0.43***)	0.24***	0.50***	0.43***	0.31***	0.32***	0.31***	1.00

Note: *Correlation values: ***p<0.001; ** p<0.01; *p<0.05*

6.5.2 Structural Equation Modelling and Hypothesis testing

The structural model was assessed through structural equation modelling in line with Research Questions 2–6 and the associated hypotheses of the study. The testing of the hypotheses start from Research Question 2. Research Question 1 investigated the meaning of project complexity (faith, faith and interaction) within the Ghanaian construction industry. The findings of Research 1 has been discussed in section 5.1

6.5.2.1 Research Question 2: How does project complexity (by faith, fact, and interaction) relate to project success?

The hypotheses developed to address Research Question 2 are:

H1a: *Complexity by faith has an inverse influence on project success*.

H1b: *Complexity by fact has an inverse influence on project success.*

H1c: *Complexity by interaction has an inverse influence on project success.*

The results on the relationship between complexity by faith, complexity by fact, complexity by interaction, and project success are presented in Figure 10 and Table 31.

Figure 10

Relationship Between Project Complexity (Faith, Fact, Interaction) and Overall Project Success

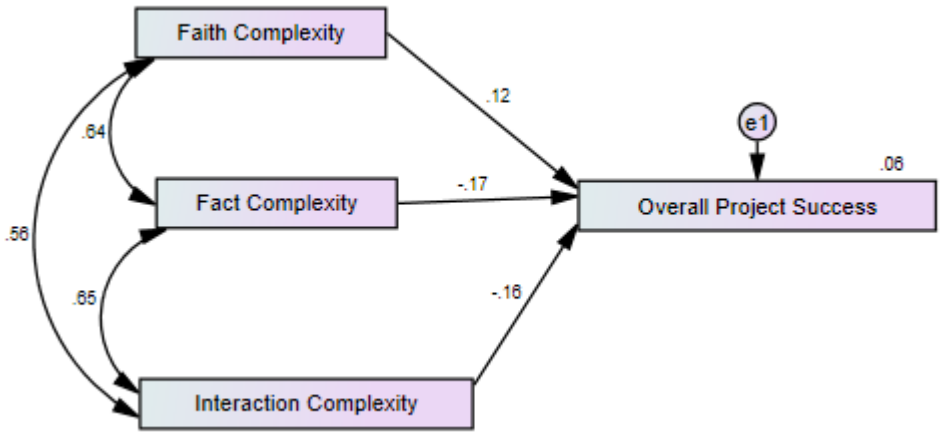


Table 31
Relationship Between Project Complexity (Faith, Fact, Interaction) and Overall Project Success

Hypothesis	Path			Effect	(Boot) T-Value	p	Hypothesis Supported?
H1a	Complexity by Faith	→	Overall Project Success	0.119	1.62	0.105	No
H1b	Complexity by Fact	→	Overall Project Success	-0.174	-2.158	0.031*	Yes
H1c	Complexity by Interaction	→	Overall Project Success	-0.158	-2.115	0.034*	Yes

Note. *p<0.05 (two-tail test)

H1a: Complexity by faith has an inverse influence on project success.

The results showed that complexity by faith had no significant relationship with project success (β = 0.12, p = 0.10). Therefore, Hypothesis 1a (**H1a)** was not supported.

H1b: Complexity by fact has an inverse influence on project success.

The results of the relationship between complexity by fact and project success are presented in Figure 9 and Table 31. The results showed that complexity by fact was negatively and significantly related to project success (β = -0.17, p = 0.031 < 0.05). Therefore, Hypothesis **H1b** was supported.

H1c: Complexity by interaction has an inverse influence on project success.

The relationship between complexity by interaction and project success is presented in Figure 9 and Table 31. The results show that complexity by interaction is negatively and significantly related to project success (β = -0.16, p = 0.034 < 0.05). Therefore, Hypothesis **H1c** was supported.

6.5.2.2 Research Question 3: How is project complexity (composite) related to project success?

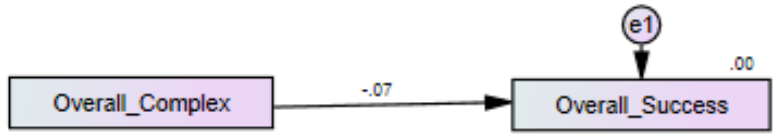
The hypothesis developed to address Research Question 3 is:

H1d*: Project complexity has an inverse influence on project success*.

The relationship between overall project complexity and overall project success, though negative, was not statistically significant (β = - 0.07, p = 0.210), as is shown in Figure 11 and Table 32. Thus, Hypothesis 1d (**H1d)** was not supported. This outcome was expected since two of the three dimensions of project complexity (complexity by fact, and complexity by interaction) had negative and marginally significant effects on overall project success, while complexity by faith had a positive but insignificant effect on overall project success.

Figure 11

Relationship Between Overall Complexity and Overall Project Success



Note. *Overall complex = Overall project complexity; Overall success = Overall project success.*

Table 32

Relationship Between Project Complexity and Overall Project Success

Hypothesis	Path			Effect	(Boot) T-Value	p	Hypothesis Supported?
H1d	Overall complexity	→	Overall Project Success	-0.07	-1.254	0.210	No

6.5.2.3 Research Question 4: What are the relationships between project leadership styles (transformational, transactional, and ethical), and project success?

The hypotheses developed to address Research Question 4 include:

H2a: *Transformational leadership positively influences project success.*

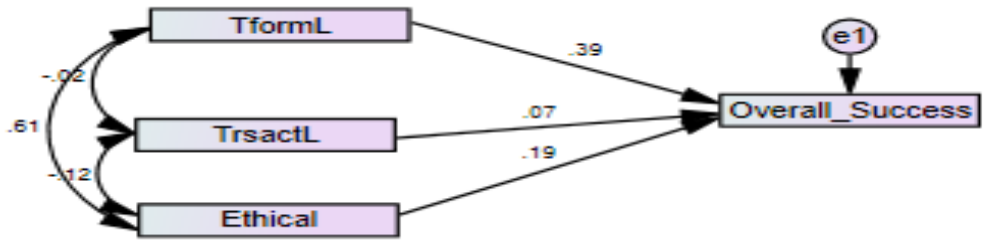
H2b: *Transactional leadership will not positively influence project success.*

H2c: *Ethical leadership positively influences project success.*

The results of the relationship between project leadership styles and project success are presented in Figure 12 and Table 33.

Figure 12

Relationship Between Project Leadership Styles and Project Success



Note. *TformL = Transformational leadership style; TrsactL = Transactional leadership style; Ethical = Ethical leadership style; Overall_success = Overall project success.*

Table 33
Relationship Between Leadership Styles and Project Success

Hypothesis	Path			β	T-Value	p	Supported?
H2a	Transformational	→	Project Success	0.392	6.490	0.000***	Yes
H2b	Transactional	→	Project Success	0.067	1.398	0.162	Yes
H2c	Ethical Leadership	→	Project Success	0.195	3.200	0.001***	Yes

Note: *Model fit indices: Chi-square = 0.01; df = 1, RMSEA = 0.00, CFI = 1.00; SRMR = 0.00; *** p <0.001 (two-tailed test).*

The results showed that transformational leadership had a significant positive effect on project success (β = 0.39, p < 0.001), thus, lending support to Hypothesis **H2a**. In contrast, transactional leadership had no significant effect on project success (β = 0.07, p > 0.1). Thus Hypothesis **H2b** was supported. Ethical leadership had a significant positive effect on project success (β = 0.19, p < 0.001), thus lending support to Hypothesis **H2c**.

Comparatively, the leadership style with the most significant positive effect on project success was transformational leadership, followed by ethical leadership. Evidence from the correlation matrix (Table 33) showed that transformational leadership was related more closely to ethical leadership than to transactional leadership. There was a statistically significant difference in the effects of transformational leadership and transactional leadership, and ethical leadership and transactional leadership.

6.5.2.4 Research Question 4: To what extent do project leadership styles (transformational, transactional, and ethical leadership) play moderating roles in the project complexity – project success relationship?

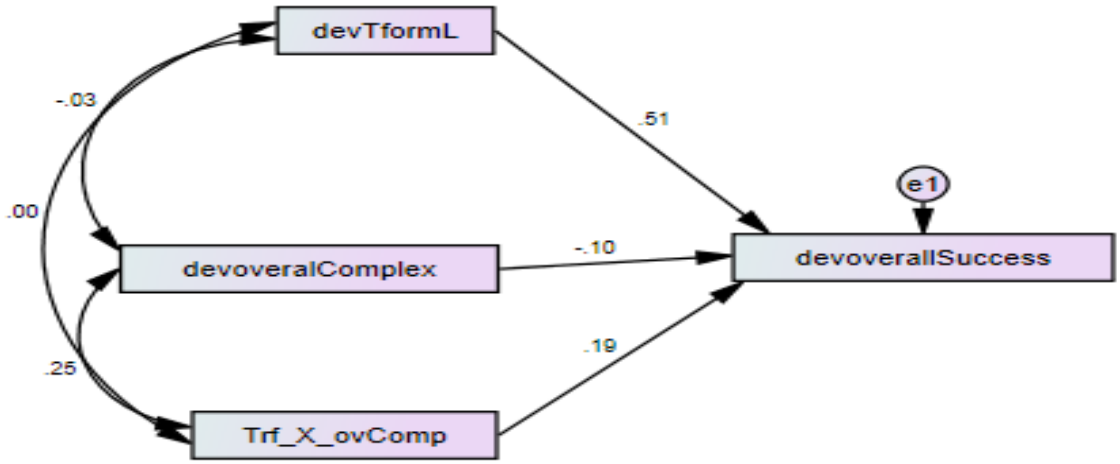
i. Moderation effect of transformational leadership in the project complexity – project success relationship

H3a: *Transformational leadership moderates the relationship between project complexity and project success.*

To assess the moderation effect of transformational leadership on the overall project complexity and project success relationship, the mean-centred values of the transformational leadership construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the “interaction variable”. Thereafter, a structural model was built using the overall project complexity (the independent variable), transformational leadership (the moderator variable), and the interaction variable to examine if they had significant effects on the overall project success, as shown in Figure 13 and Table 34.

Figure 13

Moderation Effects of Transformational Leadership Styles on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devTformL = Transformational leadership style; Trf_X_ovComp = Interaction between transformational leadership and overall project complexity; devoverallSuccess = Overall project success.*

Table 34

Relationship Between Leadership Styles and Project Success

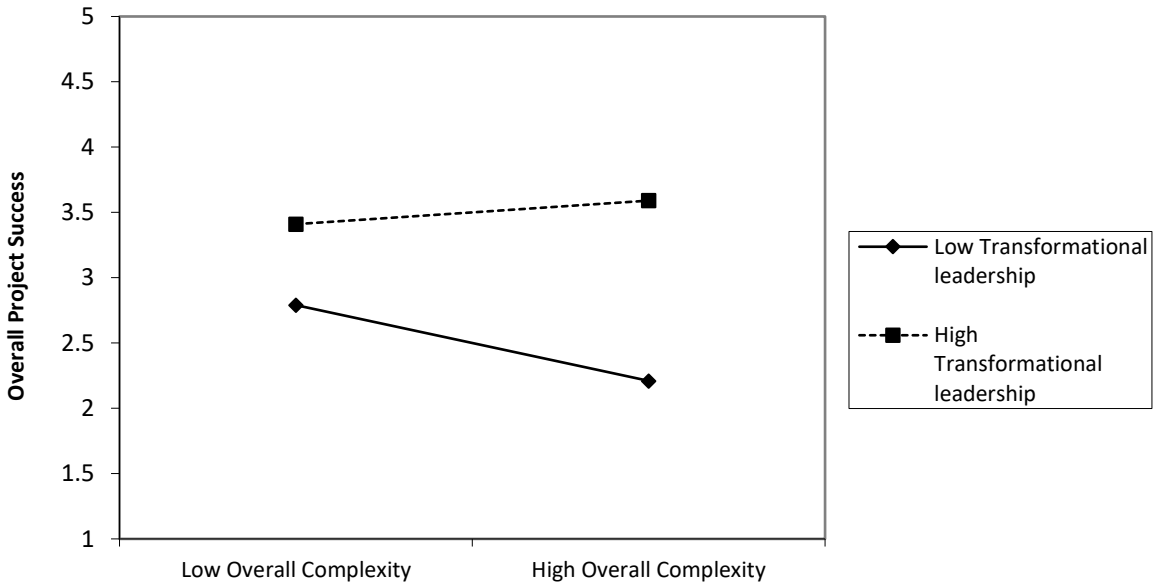
Hypothesis	Path	β	T-Value	p	Supported?
	Project Complexity → Project Success	-0.100	-2.046	0.041*	
	Transformational → Project Success	0.507	10.718	0.000***	
H3a	Transformational X overall comp → Project Success	0.19	3.890	0.000**	Yes

Note. **** p <0.001 (two-tailed test) Transformational X overall comp = the interaction between transformational leadership and overall project complexity.*

The results showed that transformational leadership positively moderated the statistically insignificant negative effect of project complexity on project success (β = 0.19, p < 0.001), therefore lending support to Hypothesis 3a **(H3a**). This implies that the transformational leadership style reduced the potential negative effect of project complexity on project success. Figure 13 provides further evidence of the moderating effect of transformational leadership. In Figure 14, the two lines are not parallel, showing evidence of moderation. The dotted line, which represents a high transformational leadership style, rises, while the solid line, representing a low transformational leadership style, falls. This confirmed that transformational leadership had a positive effect on project success.

Figure 14

Moderation Effect of Transformational Leadership Style on Overall Complexity and Overall Project Success



ii. The moderation effect of transactional leadership on project complexity and project success

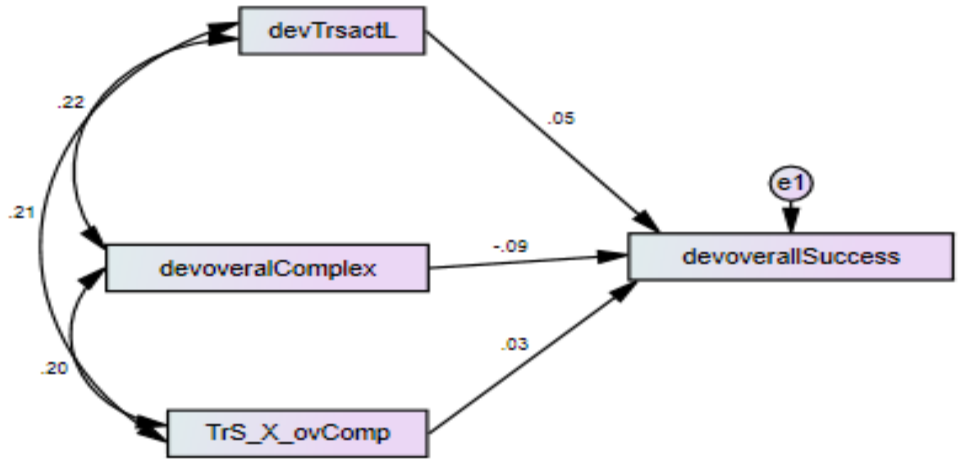
The moderation effect of transactional leadership style on project complexity and project success is presented in Figure 15 and Table 35.

H3b: *Transactional leadership does not moderate the relationship between project complexity and project success.*

To assess the moderation effect of transactional leadership on the overall project complexity and project success, the mean-centred values of the transactional leadership construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), transactional leadership (the moderator variable), and the interaction variable to examine if they had significant effects on the overall project success, as shown in Figure 15 and Table 35.

Figure 15

The Moderation Effect of Transactional Leadership Styles on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devTrsactL = Transactional leadership style; TrS_X_ovComp = Interaction between transactional leadership and overall project complexity; devoverallSuccess = Overall project success.*

Table 35

The Moderation Effect of Transactional Leadership on Project Complexity and Project Success

Hypothesis	Path			β	T-Value	p	Supported?
	Project Complexity	→	Project Success	0.087	-1.494	0.135**	
	Transactional	→	Project Success	0.050	0.858	0.391	
H3b	Trs_X_ov Complexity	→	Project Success	0.028	0.474	0.636	Yes

Note. *Trs_X_ovComplexity = the interaction between transformational leadership and overall project complexity.*

The results showed that the interaction of transactional leadership with project complexity did not have a significant effect on project success (β = 0.02, p > 0.05). This implies that the transactional leadership style did not moderate the relationship between project complexity and project success. Therefore, Hypothesis 3b **(H3b)** was **supported**.

iii. The moderation effect of ethical leadership on project complexity and project success

The moderation effect of ethical leadership on project complexity and project success is presented in Figure 16 and Table 36.

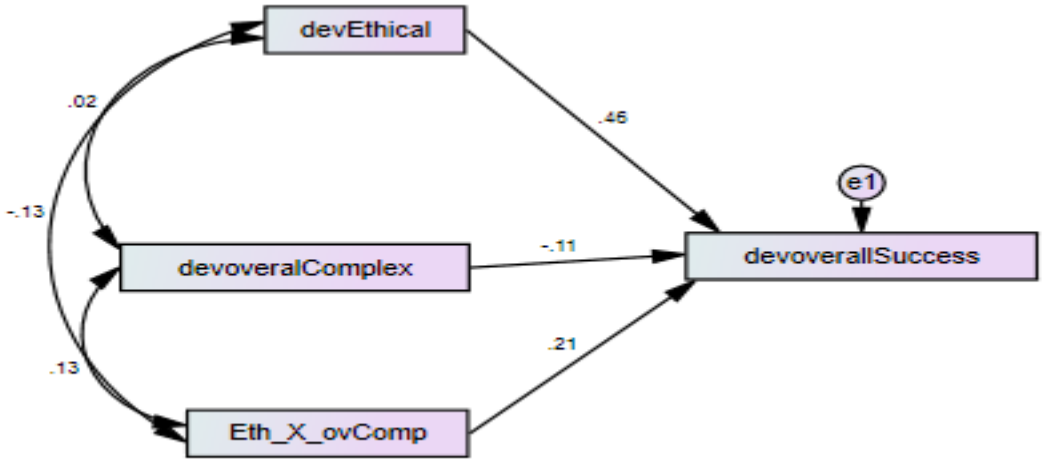
H3c: *Ethical leadership moderates the relationship between project complexity and project success.*

To assess the moderation effect of ethical leadership on the overall project complexity and project success, the mean-centred values of the ethical leadership construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity

(the independent variable), ethical leadership (the moderator variable), and the interaction variable to examine if they had significant effects on the overall project success, as shown in Figure 15 and Table 36.

Figure 16

The Moderation Effect of Ethical Leadership Style on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devEthical = Ethical leadership style; Eth_X_ovComp = Interaction between ethical leadership and overall project complexity; devoverallSuccess = Overall project success.*

Table 36

The Moderation Effect of Ethical Leadership on Project Complexity and Project Success

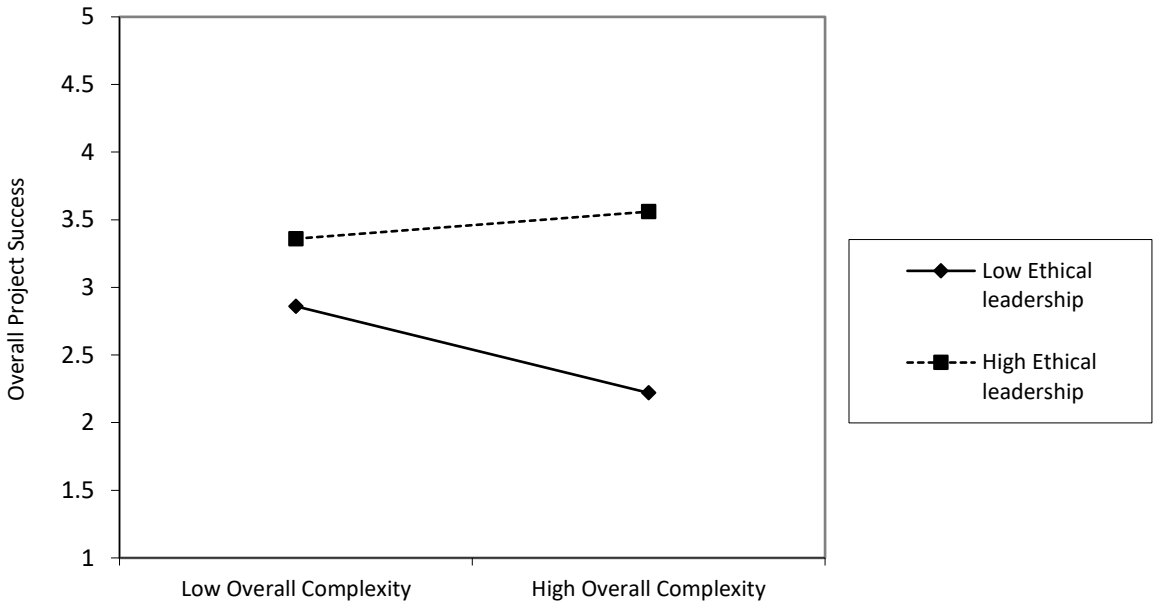
Hypothesis	Path			β	T-Value	p	Supported?
	Project Complexity	→	Project Success	-0.108	2.158	0.031*	
	Ethical Leadership	→	Project Success	0.457	9.150	0.000***	
H3c	Eth_X_ov Complexity	→	Project Success	0.209	4.156	0.000***	Yes

Note: **** p <0.001 (two-tailed test) Eth_X_ovComplexity = the interaction between ethical leadership and overall project complexity*

The results showed that ethical leadership positively moderated the negative effect of project complexity on project success (β = 0.21, p < 0.001), thus supporting Hypothesis 3c (**H3c**). This implies that ethical leadership style reduces the negative effect of project complexity on project success. Figure 17 provides further evidence of the moderating effect of ethical leadership. In the figure, the two lines are not parallel, showing evidence of moderation. The dotted line, representing a high ethical leadership style, rises, while the solid line, representing a low ethical leadership, falls, showing that ethical leadership has a positive effect on project success.

Figure 17

The Moderation Effect of Ethical Leadership Style on Project Complexity and Project Success



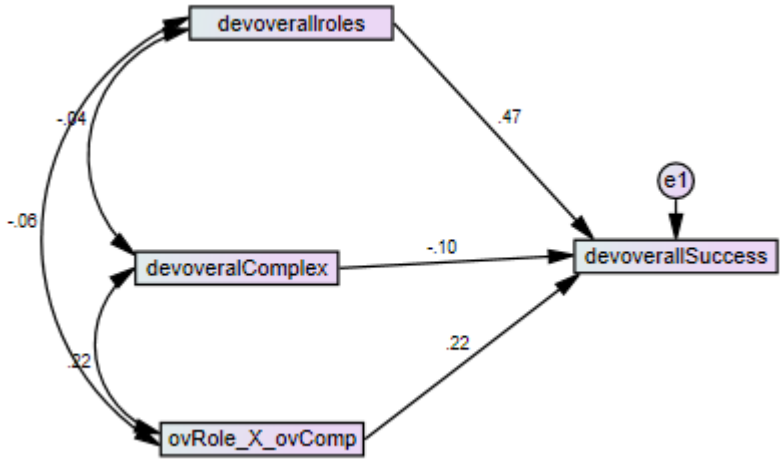
6.5.2.5 Research Question 5: To what extent do project leadership roles moderate the project complexity – project success relationship?

H4: Project leadership roles moderate the relationship between project complexity and project success.

To obtain the moderation effect of the overall project leadership role on the overall project complexity and project success, the mean-centred values of the overall project leadership role construct, and the overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), overall project leadership role (the moderator variable), and the interaction variable to examine whether they had significant effects on the overall project success, as shown in Figure 18 and Table 37.

Figure 18

The Moderation Effect of Project Leadership Roles on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devoverallroles = Overall project roles; ovRole_X_ovComp = Interaction between overall project role and overall project complexity; devoverallSuccess = Overall project success.*

Table 37

The Moderation Effect of Overall Project Leadership Roles on Overall Project Complexity and Overall Project Success

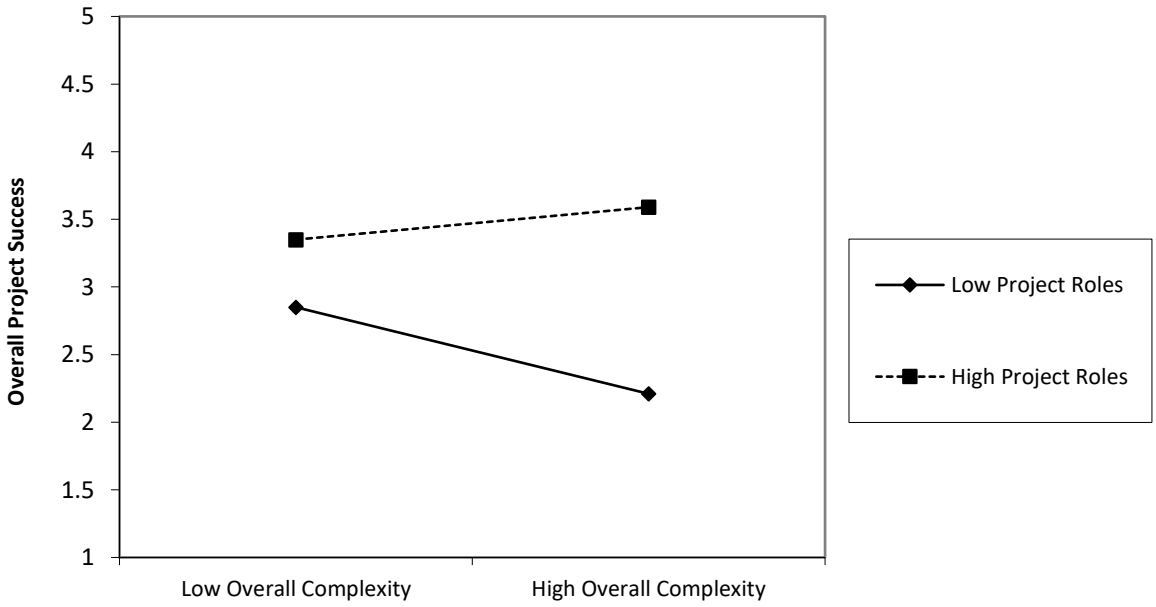
Hypothesis	Path			β	T-Value	p	Supported?
	Overall Project Complexity	→	Overall Project Success	-0.101	2.040	0.041**	
	Overall Project Roles	→	Overall Project Success	0.473	9.736	0.000***	
H4	ovRole_X_ovComplexity	→	Overall Project Success	0.222	4.460	0.000***	Yes

Note: **** p <0.001 (two-tailed test). ovRole_X_ovComplexity = the interaction between overall project roles and overall project complexity.*

The results showed that project leadership roles positively moderated the negative effect of project complexity on project success (β = 0.22, p < 0.001), thus supporting Hypothesis 4 (**H4**). This implies that project leadership roles reduced the negative effect project complexity had on project success. Figure 19 provides further evidence of the moderating effect of project leadership roles on the project complexity – project success relationship. In Figure 18, the two lines are not parallel, showing evidence of moderation. The dotted line (high project leadership roles) rises, while the solid line falls, showing that the exercise of appropriate project leadership roles reduces the negative effect project complexity has on project success.

Figure 19

The Moderation Effect of Project Leadership Roles on the Project Complexity – Project Success Relationship



The following discussions examine the moderating role of individual project leadership roles: (i) direction setter; (ii) ethical tone-setter; (iii) energiser and mobiliser; (iv) catalyst of possibilities; (v) compassionate anchor; (vi) goal orchestrator, and (vii) integrator, on the relationship between project complexity and project success.

The hypotheses utilised are as follows:

- **H4a:** The direction setter leadership role moderates the relationship between project complexity and project success.
- **H4b:** The ethical tone-setter leadership role moderates the relationship between project complexity and project success.
- **H4c:** The energiser and mobiliser leadership role moderates the relationship between project complexity and project success.
- **H4d:** The catalyst of possibilities leadership role moderates the relationship between project complexity and project success.
- **H4e:** The compassionate anchor leadership role moderates the relationship between project complexity and project success.

- **H4f:** The goal orchestrator leadership role moderates the relationship between project complexity and project success.
- **H4g:** The integrator leadership role moderates the relationship between project complexity and project success.

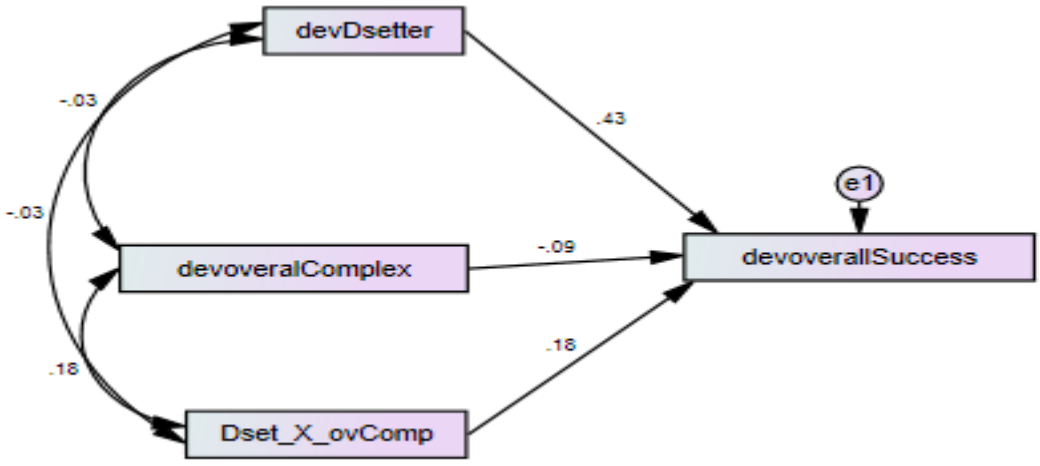
i. Moderation effect of direction setter on project complexity and project success

H4a: The direction setter leadership role moderates the relationship between project complexity and project success.

To obtain the moderation effect of the direction setter role on the overall project complexity and project success, the mean-centred values of the direction setter construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), the direction setter construct (the moderator variable), and the interaction variable to examine whether they had significant effects on overall project success, as shown in Figure 20 and Table 38.

Figure 20

Moderation Effect of the Direction Setter on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devDsetter = Direction setter; Dset_X_ovComp = Interaction between the direction setter role and overall project complexity; devoverallSuccess = Overall project success.*

Table 38

Moderation Effect of the Direction Setter on Project Complexity and Project Success

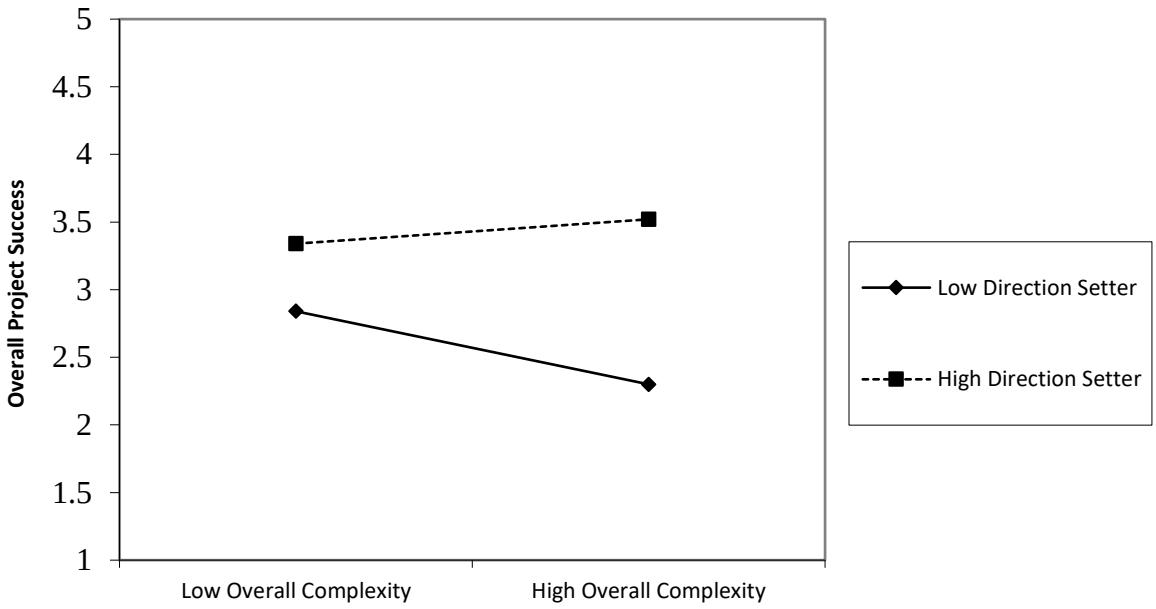
Hypothesis	Path			β	T-Value	p	Supported?
	Overall Complexity	→	Overall Project Success	-0.090	-1.769	0.077+	
	Director Setter	→	Overall Project Success	0.429	8.559	0.000***	
H4a	Dset_X_ovComplexity	→	Overall Project Success	0.176	3.448	0.000***	Yes

Note: **** p <0.001 (two-tailed test). Dset_X_ovComplexity = the interaction between the direction setter role and overall project complexity.*

The results show that the direction setter role positively moderates the negative effect of project complexity on project success (β = 0.18, p < 0.001), thus lending support to Hypothesis 4a **(H4a**). This implies that the direction setter role reduces the negative effect of project complexity on project success. Figure 21 provides further evidence of the moderating effect of the direction setter role. Figure 20 shows that the dotted line (high direction setter role) rises, while the solid line falls, showing that the direction setter role reduces the negative effect of project complexity on project success.

Figure 21

Moderation Effect of the Direction Setter Role on Project Complexity and Project Success



ii. Moderation of ethical tone-setter on project complexity and project success

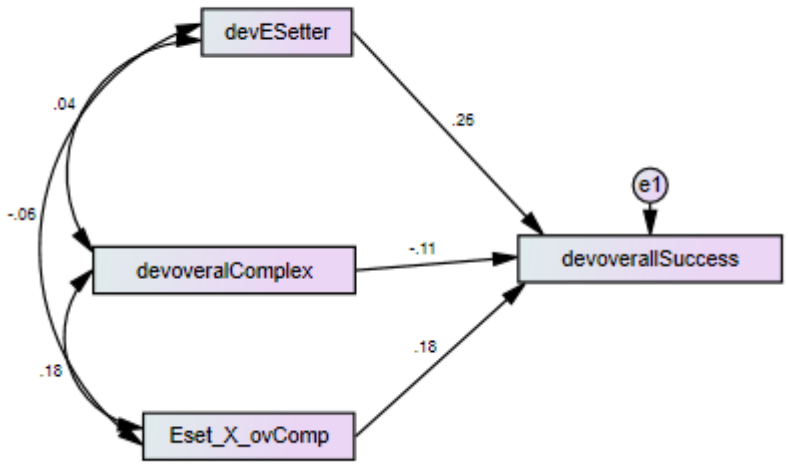
H4b: The ethical tone-setter leadership role moderates the relationship between project complexity and project success.

To obtain the moderation effect of the ethical tone-setter on the overall project complexity and project success, the mean-centred values of the ethical tone-setter construct and overall project

complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), the ethical tone-setter role (the moderator variable), and the interaction variable to examine if they had significant effects on the overall project success, as shown in Figure 22 and Table 39

Figure 22

Moderation Effect of Ethical Setter on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devESetter = Ethical tone-setter role; Eset_X_ovComp = Interaction between the ethical tone-setter role and overall project complexity; devoverallSuccess = Overall project success.*

Table 39

Moderation Effect of Ethical Tone-Setter on Project Complexity and Project Success

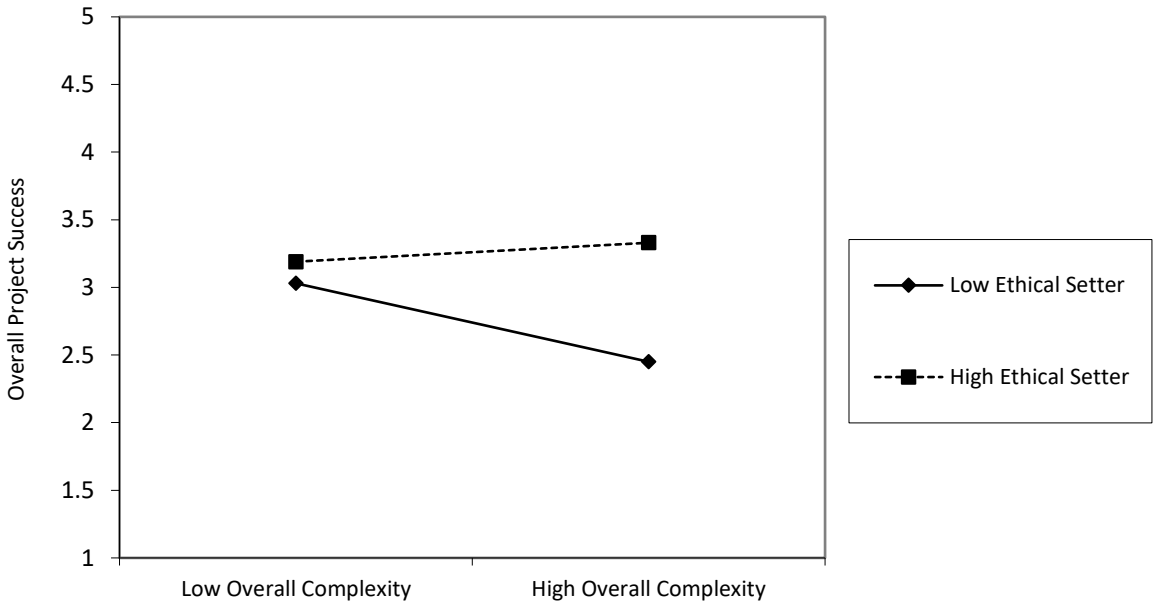
Hypothesis	Path			β	T-Value	p	Supported?
	Overall Project Complexity	→	Overall Project Success	-0.114	-2.094	0.036*	
	Esetter	→	Overall Project Success	0.260	4.828	0.000***	
H4b	Eset_X_ovComplexity	→	Overall Project Success	0.182	3.330	0.000***	Yes

Note*: *** p <0.001 (two-tailed test).*

The results showed that the ethical tone-setter role positively moderated the negative effect of project complexity on project success (β = 0.182, p < 0.001), thus supporting Hypothesis 4b **(H4b**). This implies that the ethical tone-setter role reduces the negative effect of project complexity on project success. Figure 23 provides further evidence of the moderating effect of the ethical setter role. In Figure 23, the dotted line (high ethical tone-setter) rises, while the solid line falls, showing that the ethical tone-setter role reduces the negative effect of project complexity on project success.

Figure 23

Moderation Effect of Ethical Tone-Setter Role on Overall Complexity and Overall Project



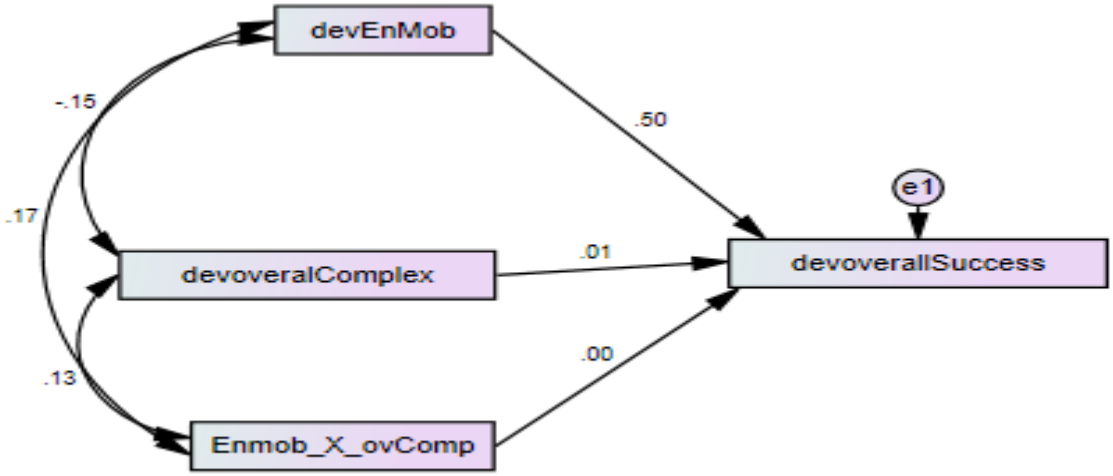
iii. Moderation effect of energiser and mobiliser on project complexity and project success

H4c: The energiser and mobiliser leadership role moderates the relationship between project complexity and project success.

To obtain the moderation effect of the energiser and mobiliser role on the overall project complexity and project success, the mean-centred values of the energiser and mobiliser role construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), the energiser and mobiliser construct (the moderator variable), and the interaction variable to examine if they had significant effects on the overall project success, as shown in Figure 24 and Table 40.

Figure 24

Moderation Effect of the Energiser and Mobiliser Role on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devEnMob = Energiser and mobiliser role; Enmob_X_ovComp = Interaction between the energiser and mobiliser role and overall project complexity; devoverallSuccess = Overall project success.*

Table 40

Moderation Effect of the Energiser and Mobiliser on Overall Complexity and Overall Project Success

Hypothesis	Path			β	T-Value	p	Supported?
	Overall Complexity	→	Overall Project Success	0.007	0.136	0.892	
	Energiser/Mobiliser	→	Overall Project Success	0.500	9.920	0.000***	
H4c	Enmset_X_ovComplexity	→	Overall Project Success	0.001	0.010	0.992	No

Note: **** p <0.001 (two-tailed test)Enmob_X_ovComplexity = the interaction between the energiser and mobiliser role and overall project complexity.*

The results show that the interaction of the energiser and mobiliser role with project complexity does not significantly affect project success (β = 0.001, p > 0.05). Thus, Hypothesis 4c **(H4c**) is not supported.

iv. Moderation effect of the catalyst of possibilities on project complexity and project success

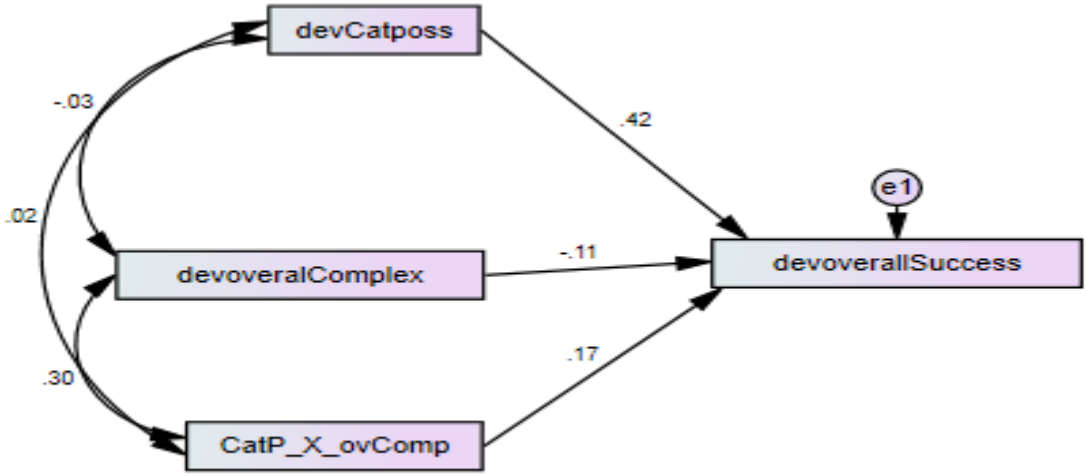
H4d: The catalyst of possibilities leadership role moderates the relationship between project complexity and project success

To obtain the moderation effect of the catalyst of possibilities role on the overall project complexity and project success, the mean-centred values of the catalyst of possibilities construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), the catalyst of possibilities role (the moderator

variable), and the interaction variable to examine if they had significant effects on overall project success, as shown in Figure 25 and Table 41.

Figure 25

Moderation Effect of the Catalyst of Possibilities on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devCatposs = Catalyst of possibilities role; CatP_X_ovComp = Interaction between the catalyst of possibilities role and overall project complexity; devoverallSuccess = Overall project success.*

Table 41

Moderation Effect of the Catalyst of Possibilities on Project Complexity and Project Success

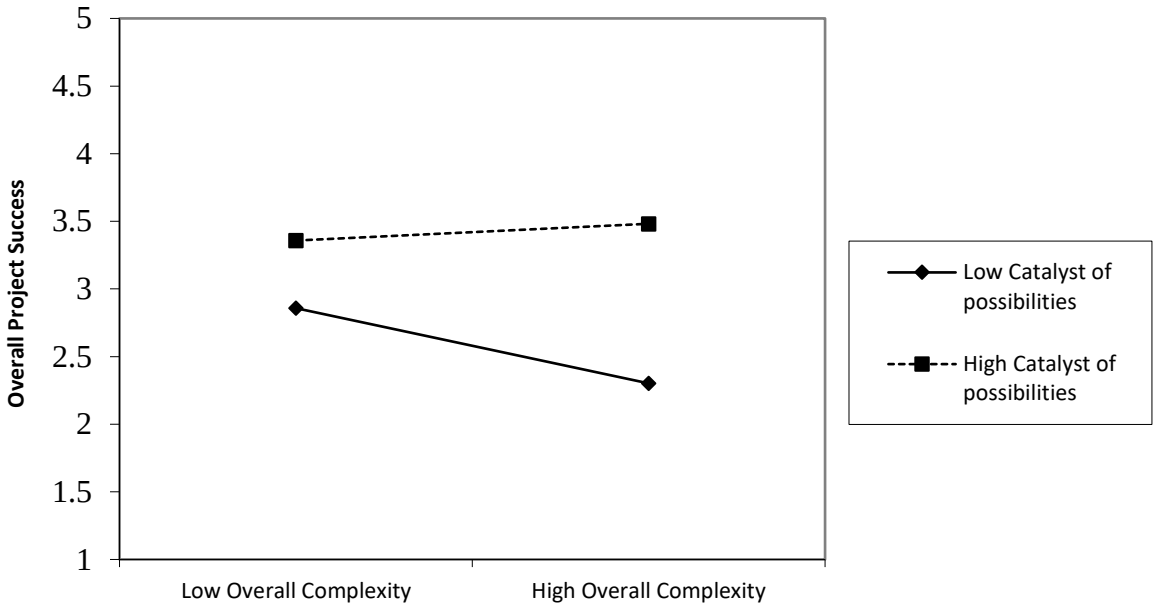
Hypothesis	Path			β	T-Value	p	Supported?
	Overall Project Complexity	→	Overall Project Success	-0.108	-2.058	0.040*	
	Catalyst of Posibilities	→	Overall Project Success	0.421	8.403	0.000***	
H4d	CatP_X_ovComplexity	→	Overall Project Success	0.174	3.319	0.000***	Yes

Note: **** p <0.001 (two-tailed test). CatP_X_ovComplexity = Interaction between the catalyst of possibilities role and overall project complexity.*

The results showed that the catalyst of possibilities role positively moderated the negative effect of project complexity on project success (β = 0.17, p < 0.001), thus supporting Hypothesis 4d **(H4d)**. This implies that the catalyst of possibilities reduces the negative effect of project complexity on project success. Figure 26 provides further evidence of the moderating effect of the catalyst of possibilities role. In Figure 26, the two lines are not parallel, showing moderation. The dotted line (high catalyst of possibilities) rises, while the solid line falls, showing that the catalyst of possibilities reduces the negative effect of project complexity on project success.

Figure 26

Moderation Effect of the Catalyst of Possibilities Role on Overall Complexity and Overall Project Success



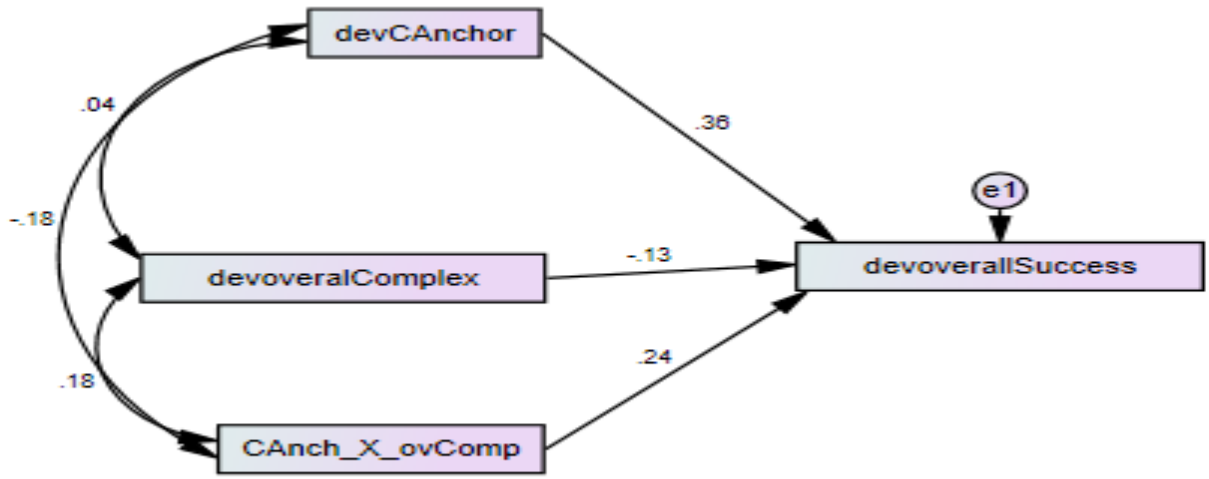
v. Moderation effect of the compassionate anchor project leadership role on project complexity and project success

H4e: The compassionate anchor leadership role moderates the relationship between project complexity and project success.

To obtain the moderation effect of the compassionate anchor role on overall project complexity and project success, the mean-centred values of the compassionate anchor construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using overall project complexity (the independent variable), compassionate anchor role (the moderator variable), and the interaction variable to examine if they had significant effects on overall project success, as shown in Figure 27 and Table 42.

Figure 27

Moderation Effect of the Compassionate Anchor on Overall Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devCAnchor = Compassionate anchor role; CAnch_X_ovComp = Interaction between the compassionate anchor role and overall project complexity; devoverallSuccess = Overall project success.*

Table 42

Moderation Effect of the Compassionate Anchor on Project Complexity and Project Success

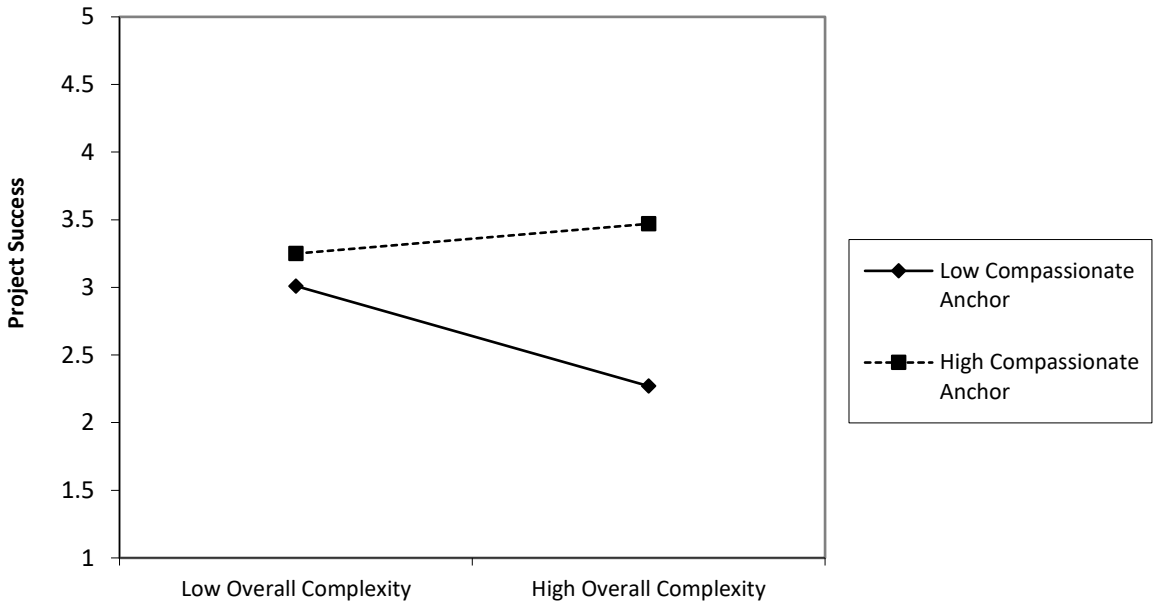
Hypothesis	Path			β	T-Value	p	Supported?
	Overall Project Complexity	→	Overall Project Success	-0.131	-2.481	0.013*	
	Compassionate Anchor	→	Overall Project Success	0.363	6.876	0.000***	
H4e	CAnch_X_ovComplexity	→	Overall Project Success	0.242	4.511	0.000***	Yes

Note. *** p <0.001 (two-tailed test). CAanch_X_ovComplexity = the interaction between the compassionate anchor role and overall project complexity.

The results showed that the compassionate anchor role positively moderated the negative effect that project complexity has on project success (β = 0.24, p < 0.001), thus supporting Hypothesis 4e **(H4e**). This implies that the compassionate anchor role reduces the negative effect of project complexity on project success. Figure 28 provides further evidence of the moderating effect of the compassionate anchor role. In Figure 28, the dotted line rises, while the solid line falls, showing that the compassionate anchor role reduces the negative effect that project complexity has on project success.

Figure 28

Moderation Effect of the Compassionate Anchor on Project Complexity and Project Success



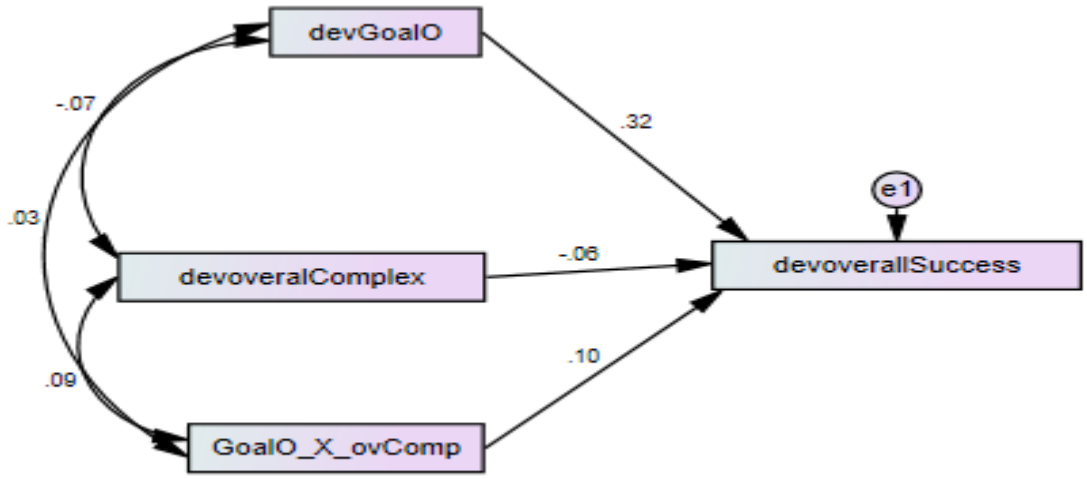
vi. Moderation effect of the goal orchestrator role on project complexity and project success

H4f: The goal orchestrator leadership role moderates the relationship between project complexity and project success.

To obtain the moderation effect of the goal orchestrator role on the overall project complexity and project success, the mean-centred values of the goal orchestrator construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), and the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), goal orchestrator role (the moderator variable), and the interaction variable to examine if they had significant effects on the overall project success, as shown in Figure 29 and Table 43.

Figure 29

Moderation Effect of the Goal Orchestrator on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devGoalO = Goal orchestrator role; GoalO_X_ovComp = Interaction between the goal orchestrator role and overall project complexity; devoverallSuccess = Overall project success.*

Table 43

Moderation Effect of the Goal Orchestrator on Overall Complexity and Overall Project Success

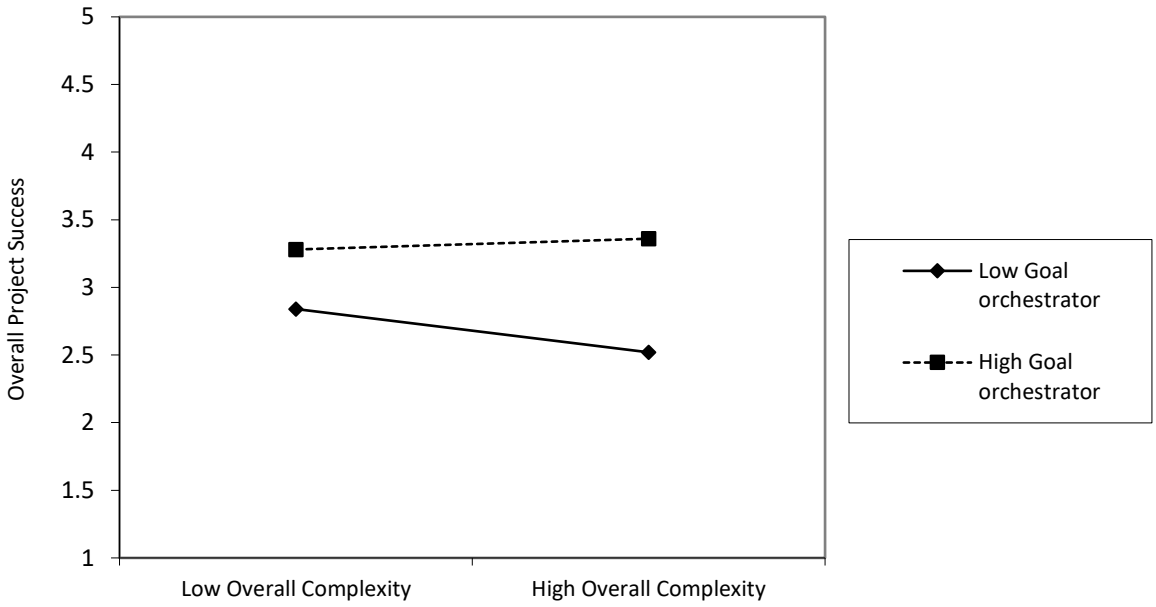
Hypothesis	Path			β	T-Value	p	Supported?
	Overall Project Complexity	→	Overall Project Success	-0.058	-1.087	0.277	
	Goal Orchestrator	→	Overall Project Success	0.315	5.925	0.000***	
H4f	GoalO_X_ovComplexity	→	Overall Project Success	0.102	1.912	0.056+	Yes

Note: **** p <0.001 (two-tailed test).*

The results showed that the goal orchestrator role positively moderated the negative effect of project complexity on project success (β = 0.10, p < 0.10), thus lending support to Hypothesis 4f **(H4f)**. This implies that the goal orchestrator role reduces the negative effect of project complexity on project success. Figure 30 provides further evidence of the moderating effect of the goal orchestrator role. In Figure 30, the dotted line rises, while the solid line falls, showing that the goal orchestrator role reduces the negative effect project complexity has on project success.

Figure 30

Moderation Effect of the Goal Orchestrator Role on Overall Complexity and Overall Project



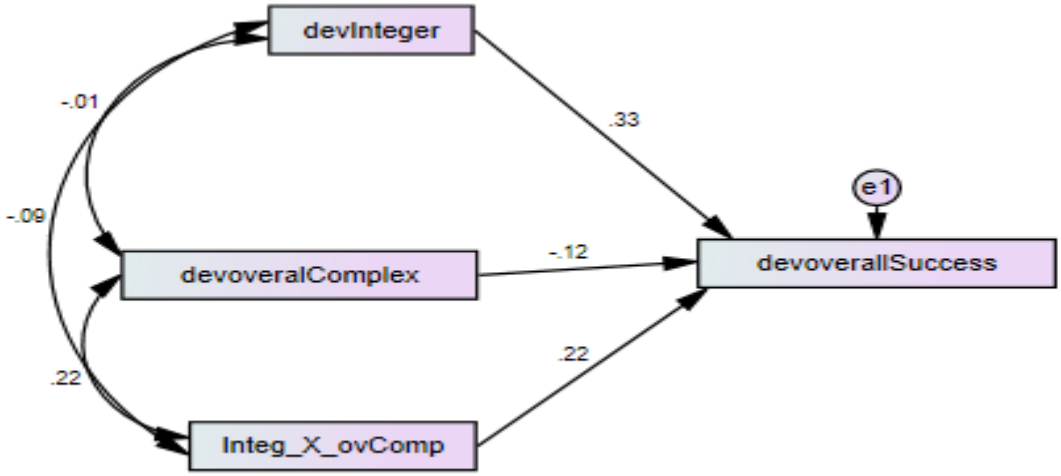
vii. Moderation effect of the integrator on project complexity and project success

H4g: The integrator leadership role moderates the relationship between project complexity and project success.

To obtain the moderating effect of the integrator role on overall project complexity and project success, the mean-centred values of the integrator construct and overall project complexity were multiplied (Aiken & West, 1991; Luo & Bhattacharya, 2006), with the resulting variable termed the "interaction variable". Thereafter, a structural model was built using the overall project complexity (the independent variable), integrator role (the moderator variable), and the interaction variable to examine if they had significant effects on the overall project success, as shown in Figure 31 and Table 44.

Figure 31

Moderation Effect of the Integrator on Project Complexity and Project Success



Note. *devoveralComplex = Overall project complexity; devInteger = Integrator role; Integ_X_ovComp = Interaction between the integrator role and overall project complexity; devoverallSuccess = Overall project success.*

Table 44

Moderation Effect of the Integrator on Project Complexity and Project Success

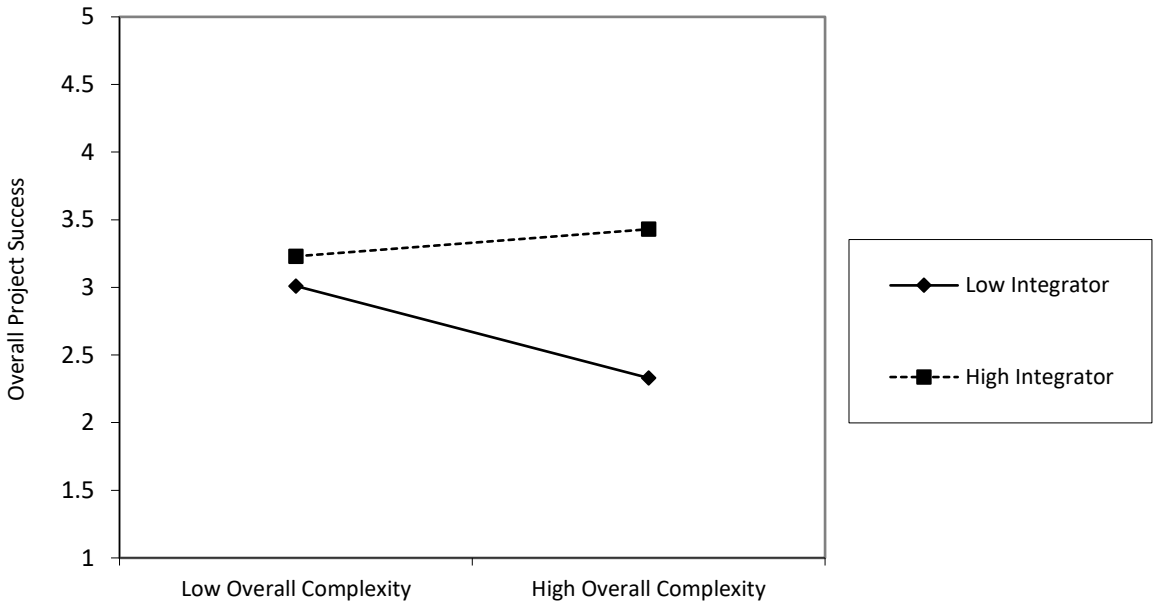
Hypo-thesis	Path			β	T-Value	p	Supported?
	Overall Project Complexity	→	Overall Project Complexity	-0.115	-2.156	0.031*	
	Integrator	→	Project Success	0.327	6.252	0.000***	
H4f	Integ_X_ovComplexity	→	Project Success	0.218	4.054	0.000***	Yes

Note*: *** p <0.001 (two-tailed test). Integ_X_ovComplexity= the interaction between the integrator role and overall project complexity*

The results showed that the integrator project role positively moderated the negative effect of project complexity on project success (β = 0.22, p < 0.001), thus, lending support to Hypothesis 4 **(H4g**). This implies that the integrator role reduces the negative effect of project complexity on project success. Figure 32 provides further evidence of the moderating effect of the integrator role. In Figure 31, the dotted line rises while the solid line falls, showing that the integrator role reduces the negative effect of complexity on project success.

Figure 32

Moderation Effects of the Integrator Role on Project Complexity and Project Success



6.5.2.6 Comparison of the moderating effects of project leadership role components on overall project complexity and overall project success

Table 45 shows the interaction effects of project leadership role dimensions on overall project complexity and project success where: Dset = Direction setter; Eset = Ethical tone-setter; Enmob = Energiser and mobiliser; CatP = Catalyst of possibilities; CAnch = Compassionate anchor; GoalO = Goal orchestrator; and Integ = Integrator.

From the results contained in Table 45, the compassionate anchor dimension of the project leadership role had the strongest moderating effect on the project complexity – project success relationship, while the energiser and mobiliser role did not moderate the relationship.

Table 45

Comparing the Moderation Effects of Project Leadership Role Dimensions

Path	B	t	p	Rank
Dset_X_ovComplexity…….>overall project success	0.176	3.448	0.000***	4
Eset_X_ovComplexity…….>overall project success	0.182	3.33	0.000***	3
Enmob_X_ovComplexity……>overall project success	0.001	0.01	0.992	7
CatP_X_ovComplexity…….>overall project success	0.174	3.319	0.000***	5
CAanch_X_ovComplexity….>overall project success	0.242	4.511	0.000***	1
GoalO_X_ovComplexity……> overall project success	0.102	1.912	0.056+	6
Integ_X_ovComplexity…….>overall project success	0.218	4.054	0.000***	2

6.5.3 Summary of Study Results

The study sought to investigate how project complexity relates with project success and the role project leadership styles and project leadership roles play in the project complexity and project success relationship. The conceptual model developed to guide the study and capture the relationship between the study variables are presented in Figure 33.

Figure 33

Conceptual Model of the Study

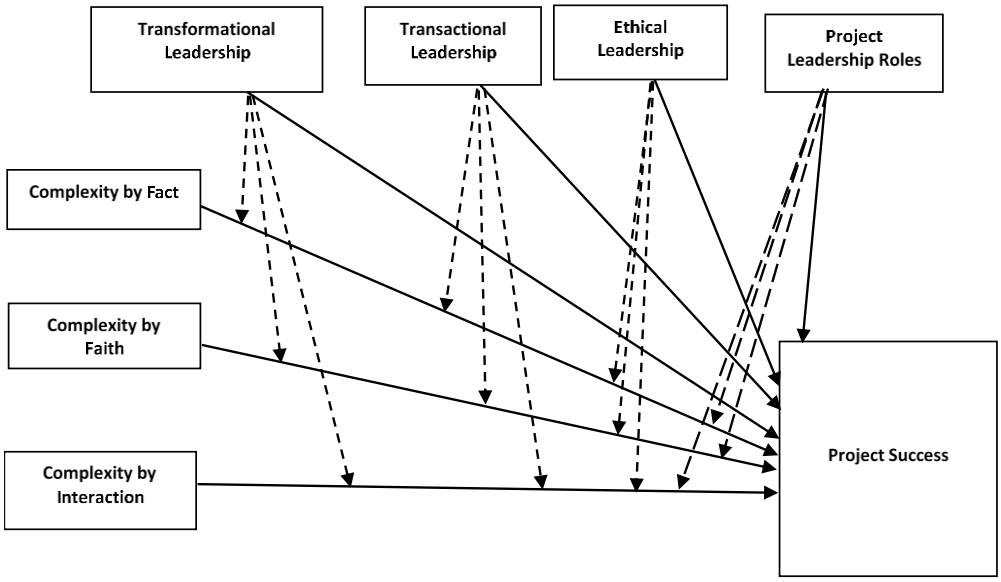


Figure 34 and Table 46 provide the summarised results of the study.

Figure 34

Results Showing Leadership Styles and Roles as Moderators on Project Complexity – Project Success Relationships

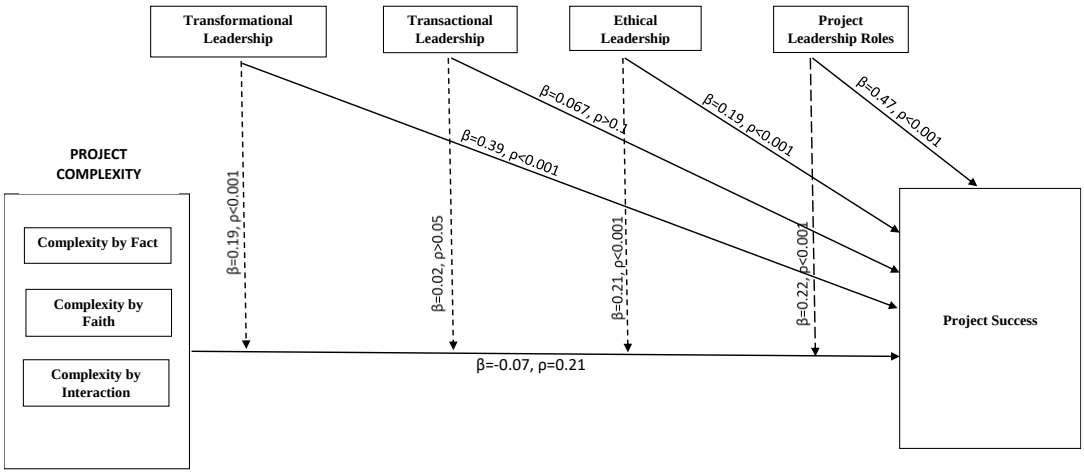


Table 46
Results of Study Hypotheses

Study Hypotheses	Effect	(Boot) T-Value	p	Hypothesis Supported?
H1*: Project complexity has an inverse influence on project success*.	-0.07	-1.254	0.210	No
H2a: *Transformational leadership positively influences project success.*	0.392	6.490	0.000***	Yes
H2b: *Transactional leadership does not positively influence project success.*	0.067	1.398	0.162	Yes
H2c: *Ethical leadership positively influences project success.*	0.195	3.200	0.001***	Yes
H3a: *Transformational leadership moderates the relationship between project complexity and project success.*	0.19	3.890	0.000***	Yes
H3b: *Transactional leadership will not moderate the relationship between project complexity and project success.*	0.028	0.474	0.636	Yes
H3c: *Ethical leadership moderates the relationship between project complexity and project success.*	0.209	4.156	0.000***	Yes
H4: *Project leadership roles moderate the relationship between project complexity and project success.*	0.222	4.460	0.000***	Yes

Table 46 indicates that project complexity has an insignificant negative relationship with project success. Although, transformational leadership and ethical leadership had a significant positive relationship with project success, transactional leadership did not. Further, while transformational leadership, ethical leadership, and project leadership roles moderated the insignificant relationship between project complexity and project success, transactional leadership did not.

7. QUALITATIVE FINDINGS

7.1 Introduction

This section of the study explores the underlying reasons for the quantitative results on the interrelationships between project complexity, project success, and project leadership styles and roles. Participants who took part in the main survey were conveniently selected and interviewed. The researcher observed that, after interviewing 20 participants, the responses had begun to provide no new data. Thus, for this study, after interviewing 20 participants, there was sufficient and significant data to comprehensively address the aims of the study. This aligns with the general sampling guideline for qualitative research which suggests that a researcher can continue sampling until no new knowledge is gained from respondents (Cooper & Schindler, 2014). This also supports the concept of information power which indicates that the more information the sample holds, relevant for the actual study, the better and the lower number of participants is needed. Information power depends on (a) the aim of the study, (b) sample specificity, (c) use of established theory, (d) quality of dialogue, and (e) analysis strategy (Malterud, Siersma & Guassora, 2016).The participants comprised 12 consultants (five civil engineers/project managers; three architects/project managers; two quantity surveyors/project managers; one electrical engineer; one mechanical engineer/project manager; and eight contractors consisting of three road engineers/project managers, two architects/project managers, one electrical engineer, one mechanical engineer and one quantity surveyor). The participants had a combined average experience of 15 years. The diverse backgrounds and experience of the participants offered the opportunity to obtain different perspectives from the participants during the interviewing process. The depth of understanding of the participants as a result of their experience significantly enhanced the quality of the dialogue. Further, the participants' diversity of experience provided a sufficient level of richness to the data analysed and the quality of the findings. Many qualitative researchers have argued that quality findings are sufficient to count for a well-executed qualitative work), where sufficiency also depends on the richness of the qualitative data (LaDonna, Artino & Balmer, 2021). The interviews were guided by the critical issues emerging from the analyses of the quantitative results. To ensure trustworthiness of the data, participants were requested to verify their transcripts prior to data analysis. Some participants were also requested to provide feedback on themes and sub-themes emanating from the data analysis to establish credibility. Member checking has the capacity to ensure the trustworthiness of the interpretation of qualitative data (Lincoln & Guba, 1985). Further, some researchers argue that having at least one external auditor (a role which was actively played by my supervisor) is critical to ensuring trustworthiness of qualitative data (Hill et al., 2005; Williams & Morrow, 2009).

7.2 Findings

The main subthemes and themes of the thematic analysis identified from the interviews are contained in Table 47 and these have been discussed subsequently.

Table 47
Main themes and subthemes from the thematic analysis

Main themes	Subthemes
Theme 1: Uncertainty and unforeseeable incidents contribute to complexity by faith, which adversely affects project success.	1.1 The uncertainty and financial cost of innovative solutions can reduce overall project benefits. 1.2 Having experienced project teams can reduce the overall negative effects of complex project outcomes.
Theme 2: Large sets of interdependent data contribute to complexity by fact, which adversely affects project success.	2.1 Improper management of data can affect project outcomes negatively. 2.2 Potential scope changes associated with complex projects tend to contribute to project failure.
Theme 3: Organisational and stakeholder interfaces complicate projects by interaction, which adversely affects project success.	3.1 Dealing with varied organisational processes can delay project activities, leading to poor outcomes. 3.2 Poor stakeholder engagement can contribute to project failure. 3.3 Lack of user involvement in the project inception stage can affect project acceptance.
Theme 4: Transformational leaders' focus inspires team members and stakeholders, which promotes successful project outcomes.	4.1 Transformational leadership inspires project teams to achieve success by providing direction and empowerment. 4.2 Leaders who encourage, and are supportive of, teams need to get the team to do more, leading to successful outcomes. 4.3 Transformational leaders encourage and stimulate project teams to do more in difficult project situations, thereby improving project outcomes.
Theme 5: Ethical leadership builds trust, which positively enhances project outcomes.	5.1 Ethical leaders insist on professionalism and demand strict moral standards. 5.2 When leadership is fair and open, it builds the team's trust and promotes successful project outcomes. 5.3 Ethical leaders lead by example by modelling hard work for project teams to emulate with the potential to improve on poor project outcomes.
Theme 6: When leadership is preoccupied mainly with technical aspects of the project, successful project outcomes are not promoted.	6.1 Transactional leaders focus more on work than people's needs, and therefore do not motivate project teams enough for successful project outcomes. 6.2 Project teams tend to do just enough, which may not be good enough in difficult project situations.
Theme 7: Fulfilling the project leadership roles tends to promote project success.	7.1 The majority of project leadership roles foster good relationships, and build, inspire, and enhance successful project outcomes. 7.2 The energiser and mobiliser role is only effective when leaders are knowledgeable, have the expertise, and are tactful in its application.
Theme 8: The relationship between project complexity and project success is not simple.	8.1 *Experienced project teams significantly influence the relationship between project complexity and projects success.* 8.2 *The ambiguity around what constitutes success of complex projects makes clarity of achievement of project success difficult.*

7.2.1 Theme 1: Uncertainty and unforeseeable incidents contribute to complexity by faith, which adversely affects project success.

7.2.1.1 Subtheme 1.1: The uncertainty and financial cost of innovative solutions can reduce overall project benefits.

Participants were of the view that construction projects that are novel and which require innovation can be expensive. The participants indicated that some construction projects may be challenging because they may be new to the firm and may contain a design or process that is not familiar. The participants stated that novel construction projects which require innovative solutions may require specialised skills, technology and systems, which project teams may not be well equipped to handle. When construction firms perceive that the project is novel and requires specific innovative solutions, they invest extra and higher quality resources (than for a normal project) to cater for any potential adverse outcome (Hanisch & Wald, 2014; Tatikonda & Rosenthal, 2000). Participants felt that extra measures by management can be in the form of employing more skilled people and by delegation of more work. This means that construction projects characterised by novelty may be given closer management attention (Geraldi & Adlbrecht, 2007; Luo et al., 2017; Müller et al., 2011). With the injection of more resources, the project may be successful, but this may increase the project cost and potentially reduce profit margins. Some participants commented as follows:

> *P11: Solving complex problems may have cost issues. The additional money needed to undertake the innovation can come at a huge cost which can influence the project budget. Innovation may have happened but may have taken a long time, causing delays to the project and eventually its negative influence. Bringing on the needed expertise can also come at a huge cost, invariably affecting overall project outcomes.*

> *P14: Innovation that takes time can have cost implications and have an overall negative impact on the project. The kind of innovation is also important.*

> *P15: In my experience, it makes a big difference because the client doesn't sometimes get to bear the actual cost of that innovation because the stage for any further negotiations may have passed by the time you face such complexities, so you can't go for more resources. Your organisation would have to bear that cost. Sometimes, for some professions, innovation and solving new problems may be subtle and not too obvious. Perhaps for architects, because their work is quite open, one may see and appreciate*

innovation, but for engineers and contractors, you hardly get excited about solving such problems.

This finding corroborates that of Tidd and Bodley (2002), who argued that developing new techniques to solve unique challenges can be a high-risk activity owing to the high costs linked to such activities. In addition, the cost of implementing innovative ideas during projects can be significant and, although this may make a positive contribution to projects, the overall project cost may be high, thus minimising the significance of the novelty (Price, 2020). Again, Fugar and Agyakwah-Baah (2010) noted that, among many Ghanaian construction firms, the idea of solving unique challenges – though advantageous for their reputation – is not so enticing because of the high cost associated with finding solutions to such complexities. Innovation in the construction industry is very expensive in terms of resources needed, time, and cost of implementing novel ideas (Price, 2020). This is also due to the fact that experts in construction are usually highly skilled professionals whose services come at high expense (Patanakul et al, 2016). Also, the nature of the machinery used in construction, especially for complex projects, means that any additional acquisitions come at a great cost to the organisation. Furthermore, project teams have to spend more man-hours to understanding, redesigning and implementing unique solutions and all these man-hours are charged to the account of the organisation.

7.2.1.2 Subtheme 1.2: Having experienced project teams can reduce the overall negative effects of complex project outcomes.

Project complexity is typically associated with negative outcomes such as increase in cost, time, and additional resources. The participants were of the view that novel projects that require innovative solutions and the adoption of new techniques and systems can be successful when project team members are experienced. The participants indicated that project experience can be expressed in terms of the number of years that a team has spent on a project, and the number and types of project teams that have been involved, or both. The number of years and number of projects and types are proxies because the main factor that becomes instrumental in novel projects is the knowledge and skills possessed by project team members. The participants stated that project teams which have gained more experience working on projects are more likely to have faced complex situations and, through this exposure, may have gained skill and competencies. The participants took the view that such experienced project teams are likely to transfer their vast knowledge, skills, and abilities accumulated across various construction projects and vast periods of time to solve problems

associated with novelty and innovation. Further, the participants indicated that the extent to which project teams transfer their knowledge and skills from prior projects may not be conscious and intentional.

Some of the comments from the participants were as follows:

> P19: *This could be because the fact that it is novel [complex] does not mean that it shall impact significantly because the team may have enough experience to deal with the complexity.*
>
> P16: *When you solve a new problem sometimes you do not see that it's significant because you might have faced a lot more challenging ones in other projects. Having deep knowledge and unravelling difficult situations can sometimes not be appreciated because that is what you are used to. So, a deep understanding of experts in the industry makes them see complex and difficult issues on projects as a normal phenomenon though [they may seem] complex and of high value to less experienced people. Experience is essential in this case.*

The participants were of the view that sometimes exposure to more challenging and complex situations means that current challenging situations may hold no significance to the project team. Prior experience can therefore make project teams habituated to complex situations.

7.2.1.3 Concluding thoughts on theme 1

Various studies have found a negative relationship between complexity of faith and project outcomes (Bjorvatn & Wald, 2018; Damasiotis & Fitsilis, 2019; Floricel et al., 2016). The findings under theme 1 sheds some light on the important role of project team's experience in moderating the negative influences of complexity by faith on project outcomes. The role of experience on project outcomes has been confirmed in a study by Bjorvatn and Wald (2018) which found that unique project complexities are more likely to lead to project failure than complexities connected to interdependencies and facts when project teams lack the requisite expertise to handle such complexities.

Experience generally includes know-how or procedural knowledge and knowledge from exposure. The project environment can be considered as bodies of knowledge and this knowledge can create opportunities for the success of projects. This is because project management work is knowledge-intensive and project teams are knowledge workers. The effective management of uncertainty requires in-house knowledge and skills, and the embedding of uncertainty management in the project's processes. When uncertainty management and knowledge are embedded in a project's processes, the

project would benefit from skills that can be integral to the creation of an uncertainty-mature culture. In addition to training and project team development programmes, organisation policies, routines, procedures, reports, and manuals for developing effective uncertainty management, it is also important to have a knowledge management system that would facilitate activities such as creation, administration, dissemination, and utilisation of project knowledge (Lee et al., 2015; Zhang & Cheng, 2015). Moreover, the generation of knowledge requires an environment of openness and respect for others' views and opinions. This would facilitate the creation of a knowledge-sharing culture which can be integral to the successful delivery of projects.

7.2.2 Theme 2: Large sets of interdependent data contribute to complexity by fact, which adversely affects project success.

7.2.2.1 Subtheme 2.1 Improper management of data can affect project outcomes negatively.

Project data are one of the most valuable resources that drive decision-making. Project data are only useful when they are of high quality. The participants stated that information that is erroneous and misleading or is presented in a confusing way can have a huge impact on the decision-making in the project environment. The participants indicated that when available information is of low quality, such as data that are missing, inaccurate, outdated, and unformatted, efforts geared towards deriving information may be a futile venture and a waste of time and manpower. In addition, the fatal mistake would be to unknowingly make use of inaccurate and outdated data in decision-making. The participants found that when decisions are based on inaccurate and outdated data the decisions may not reflect project reality and can lead to project failure. In this regard, the collection, analysis and decision-making process using data are important project activities that have the tendency to affect project outcomes. Some participants indicated the following:

> P3: *Not properly processing the project data and understanding the details well can lead to difficulty.*
>
> P5*: If you don't properly preserve the integrity of your data by keeping it safe and void of errors, you will create serious challenges with project outcomes.*
>
> P7*: The reason is that project teams do not do a thorough review of the data. This leads to poor planning of the project.*

From the participants' perspective, the poor management of data can lead to severe challenges on projects and can eventually lead to project failure.

Some participants were of the view that information management which involves data collection, analysis, and decision-making, like most project activities, is carried out using human skills as well as machines. As such, the participants indicated that the quality of information management relies extensively on the quality of human skills and availability of machinery and resources expended on the collection and analysis of project information. The participants believed that, in the modern era of technology, the project environment is also experiencing some form of advancement and the utilisation of more advanced technology. The sheer volume of information produced and the limited human cognitive capacity mean that information technologies have a significant role in ensuring proper data management. The improper management of project data therefore points to lack of skills and the low involvement of information technology. Some participants commented as follows:

> P1: *Dealing with large data may require using expensive software to analyse, but most firms and people don't even understand how this software work in the first place to even talk about embracing them.*

> P11: *You need modern equipment and technology to be able to effectively manage complex data, but you also need staff who know what to do with the equipment*.

Challenges in the construction sector, such as the wasting of time and cost, can be attributed to the lack of proper coordination as a result of less than optimum information handling and exchange, that is either inadequate, inaccurate, inappropriate, inconsistent, late, or a combination of these. Information technology (IT) plays an important role in improving the effectiveness of communication and information exchange in the context of managing a construction project. Without the effective use of IT to facilitate the process of information management among project participants, technology is unlikely to realise major improvements within the project. The need to maximise the efficiency of most construction business processes through the exchange of massive amounts of data at a cheaper and faster rate is most urgently required.

This finding has highlighted the sensitive nature of project information management and how data application challenges can hamper successful project outcomes. Against the backdrop that data and information play central roles in project planning and implementation, project teams' inability to effectively collect, understand, and interpret the information provided about the project will ultimately lead to challenges. Based on the finding, this situation has been exacerbated by the seeming

lack of data management expertise among project teams in the Ghanaian construction industry. This is even more crucial since access to tools and technology that can aid in data computation and analysis is not readily accessible to project teams in Ghana's construction industry.

7.2.2.2 Subtheme 2.2 Potential scope changes associated with complex projects tend to contribute to project failure.

According to participants, construction projects are typically characterised by elaborate scope changes with many complicated deliverables which can mostly be daunting to project teams. Alterations to the scope of projects, which represent addition or subtraction to predetermined scope of work, is common in most projects. The participants mentioned that scope changes can be initiated by project stakeholders for a number of reasons. When scope changes are initiated during the execution of the project, it would typically imply more cost, resources, time, and risks. More often, it is a series of minor scope changes that can accumulate to cause changes to projects that ultimately affect project outcomes, rather than large scope change. The participants' experiences are that responding to scope changes constitutes extra work that must be delegated, which implies that project teams have to combine ongoing activities with incoming activities associated with the change. As a result of the increased workload and rapid changes, project teams may find it difficult to prioritise project activities and also keep track of required activities within the scope changes. These can contribute to project failure. The following are comments from some of the participants:

> P6: *Complex projects tend to have more complex technical challenges, hence a potential for failure … also due to associated scope changes.*

> P17: *The more projects' scope are altered, the less successful they tend to be, and affects project team and users' interest negatively because projects are broadly to serve needs. So if the beneficiaries' needs are not met it will be a negative outcome for the project.*

Project teams are unable to focus on the bigger picture because of the time spent readjusting minute details due to scope changes. Scope changes also lead to the creation of new project activities, which can be difficult to harmonise with ongoing activities. One of the primary mechanisms that are widely utilised in projects for dealing with complexity, particularly in the construction industry, is the approach of deconstructing project activities into organised work tasks and assigning the work activities to a group. Each group undertakes tasks that are related to their work, which leads to the creation of a specific view of the project. These activities are then executed, as though they are independent of each other. In executing the tasks, certain activities must precede other work, and

certain actions or outcomes influence other tasks. Additionally, a few individuals involved in the project have direct responsibility for overall coordination (e.g. the project manager). By and large, however, project teams adopt a view that focuses solely on their tasks, with any concerns about these interdependencies addressed in a reactive and ad hoc manner. Most participants try to optimise their own work while the few people responsible for managing the project as a whole have little opportunity to optimise the entire system (bigger picture). The resultant effect is that project quality is affected in the long run.

Additionally, frequent scope changes can be demoralising to the project team and thus dampen the enthusiasm with which the project team works. This stems from the fact that project teams may grow tired of seeing their initial tasks undone. An opinion expressed by a participant is reflected below:

> *P17: The more projects' scope are altered, the less successful they tend to be and [they] affect project team and users interests negatively …*

Ansah (2011) reported similar findings in a study that was conducted to identify the cause and effects of delayed projects. Based on Ansah's findings, causes of delays included complexity issues such as client-related factors like clients' frequent and incessant desire to alter the scope of work owing to financial challenges and indecision. Such frequent changes, according to Ansah (2011), create dissatisfaction among project teams, influence project schedule, and significantly affect project quality. In this finding, project scope changes and technical issues can increase the level of complexity inherent in construction projects, particularly with regard to the maintenance of quality standards. Dao et al. (2016) also insisted that frequent scope changes influence project success by reducing the ability of the project to be completed within the scheduled time, increasing the resources used on the project, and reducing the ability of the project to meet the expectations and satisfaction of stakeholders, especially end-users.

7.2.2.3 Concluding thoughts on theme 2

The findings under this theme show the importance of information management to the success of complex projects in Ghana's construction industry. The project team's ability to manage, analyse and apply project information for decision making is thus critical if project teams are to minimize the negative effect of dealing with large volumes of information. The findings confirm that the conditions inherent within Ghana's construction industry (i.e., size, cost and quality of the project, multiple and diverging stakeholder interests, as well as cultural and social factors) present conditions that project

managers have to constantly manage to deliver projects that meet the cost, quality and time requirements. Most times dealing with these factors can be overwhelming and complicated, leaving project teams handicapped resulting in poor project performance in terms of schedule, cost and quality (Ofori, 2012). Furthermore, the complicated nature of information management shed more light on why complexity by fact was negatively related to project success within the Ghanaian context. This follows from the fact that the inability of project teams to properly interpret and apply data correctly often leads to difficulties (as applies to cost, schedule, and quality) in the execution of projects, hence leading to project failure. The findings are corroborated by Wood and Gidado (2018); Bjorvatn and Wald (2018) who made similar findings in their respective studies.

Scope-related and technical challenges created by complicated project scopes and technical details coupled with project teams' inability to make useful interpretations of project information has major negative implications on projects. The findings also support works of previous research that suggest that complexity by fact occurs on projects when project teams have to deal with large volumes of interdependent information and projects have the propensity to lead to project failure when poorly managed (Dunović et al.,2014). The findings also reveal the extent to which frequent scope changes can affect project outcomes in the long run. The more frequently project scopes are changed, the more complicated and relatively more challenging the project becomes. This, therefore, places more strain and demands on the skills, knowledge, and interrelationships of project managers and teams, thereby constraining their ability to meet the success requirements of projects, such as completing within the specified time, staying close to the stipulated budget, and meeting user expectations.

7.2.3 Theme 3: Organisational and stakeholder interfaces complicate projects by interaction, which adversely affects project success.

7.2.3.1 Subtheme 3.1 Dealing with varied organisational processes can delay project activities, leading to poor outcomes.

Participants commented that the lack of proper management of organisational processes and their related interdependencies on complex projects usually have negative influences on project outcomes. The lack of proper management internal interdependencies is evident in obtaining internal approval. Additionally, external interdependencies manifest in the form of seeking instructional and regulatory permits from supervisory and regulatory bodies before projects are executed. Internal processes and their related interdependencies could take the form of communication, and information interpretation owing to project teams' varied professional and academic training.

> P11: *Dealing with varied processes and institutional processes can delay projects when not well managed … In our setting, as more interactions take place, it tends to lead to corrupt practices which would have an overall negative impact on the project outcomes.*

In the Ghanaian construction industry, however, external processes may involve seeking building permits, fulfilling construction standards, seeking procurement approval, among others. Construction projects typically have a multiplicity of stakeholders whose interests must be taken fully into account as an integral part of the design, construction, and facility management process, if the project is to be successful (Karlsen, 2002; Rowlinson & Cheung, 2008; Saad et al., 2020).

The participants found that managing the relationships with and between stakeholders is performed daily in the normal course of business. In construction, there has traditionally been a strong emphasis on the internal stakeholder relationship, such as procurement and site management, while the external stakeholder relationships to some extent have been considered as a task for public officials via the rules and legislation that concern facility development.

While internal processes can be easily managed as the project life cycle goes on, external processes require each stage to be completed before projects can move to another stage. Some of the views of the participants are presented below:

> P10: *Internally in construction, the drainage engineer, structural engineer, etc., depend on each other's work in the team and therefore lack of understanding of how one person's work affects the other can create problems for project outcomes. Externally, as a consultant working with a contractor, issues of miscommunication especially when lots of people are involved can lead to failure.*

> P4: *Stakeholders whose interests are negatively impacted can cause problems for the project by delaying the activities. When more people are involved, there are more dependencies and decisions that take long in coming. Once there is a delay, it can lead to poor project outcomes.*

> *P8: In construction, alliances have to be created through cordial relationships that are nurtured constantly. It is easy to manage relationships that involves parties you see constantly as compared to the external parties.*

Nonetheless, both external and internal processes are difficult to handle and, as a result, create major complexities for project managers and their teams. This is because each process within the project life cycle has systemic effects on the other processes and hence a delay, challenge, or failure of one

process will have a catastrophic impact on the other processes, and their related independencies ultimately affect project schedule, cost, and quality delivery.

7.2.3.2 Subtheme 3.2 Poor stakeholder engagement can contribute to project failure.

According to participants, the varying nature of stakeholders' interests needs to be properly managed in a manner that creates positive outcomes for the project. The participants stated that construction projects are achieved through collaboration, often involving various individuals and parties who may influence the outcomes of the project. The participants indicated that effective stakeholder engagement requires the manager to identify important stakeholders and their contributions. As such, project managers must possess analytical and intuitive skills to be able to identify and work with stakeholders. Within construction projects, the stakeholders who typically require engagement include customers, end users, project sponsors, and contractors. Some of the responses of the participants were as follows:

> P1: *Having lots of stakeholders and interests can bring delays to decision-making that affects project success. If you have more people to work with, one person's error can have a ripple effect on the project negatively. Miscommunication can also cause problems leading to project failure. Taking stakeholder consultation issues for granted can lead to problems if they are not well engaged, poor interaction, and not involving all stakeholders.*

> P14: *The systems for managing stakeholder interest in our jurisdiction are lax. Most times you find that instead of a proper and uniform approach to managing stakeholders on a project, what is common is an ad hoc system. So, problems that must be dealt with much earlier end up delaying the progress of work at very crucial moments.*

Some findings suggested that stakeholder engagement offers the project manager the opportunity to communicate and to get to understand the expectations, and collaboratively design plans and actions towards achieving the project goals.

The active engagement of stakeholders requires that project managers have excellent communication and relationship-building capabilities, as well as solid business acumen and an understanding of how stakeholders interact. Specific skills and knowledge required for stakeholder management include ability to build relationships, ability to understand stakeholder perspectives, interviewing skills to understand the needs and wants of stakeholders, strong verbal and written communication skills, and people-oriented skills. The ability of project managers and project teams to coordinate the various

facets of a complex project and communicate properly and effectively on the project is a determining factor for project success or failure. The inability to coordinate tasks and dependencies and to communicate with both internal and external stakeholders can have a dire consequence on project schedule, cost, and quality.

This study found that project stakeholders comprising project managers, project sponsors, customers, and users are affected by projects and therefore they strive to maintain some level of influence on a project (Cleden, 2012). The goal of project teams should not be about sidestepping such varying interests but rather about developing well-coordinated processes and systems to effectively manage them. In typical projects with different stakeholders, all the different interests and motivations make the project complex. The lack of proper engagement among these stakeholders could harm project outcomes. Furthermore, the interaction between stakeholders serves as a challenge because stakeholder interests have been found to conflict with each other (Davis, 2017; Mir et al., 2014). Consequently, when these varied stakeholder interests are not well handled, they can negatively affect project success.

7.2.3.3 Subtheme 3.3 Lack of user involvement in the project inception stage can affect project acceptance.

Participants stated that project users and customers play important roles in ensuring the success of construction projects. The conception of the project idea that initiates the process of construction begins with the customer and the user. Customers and users are involved at the initial planning stages of the construction and provide the funds and specifications for the entire construction. The participants took the view that customers and users determine the overall purpose of the project. though they are not associated with the day-to day execution of the project activities. The absence of the customers and users in the day-to-day activities of the project means that they may lose touch with the realties, changes and events that unfold on the project site. Construction projects are typically huge and involve many stakeholders other than customers and users, such as contractors, and architects. Some of the responses from participants are presented below:

> P16: *Success should be looked at from the perspective of the stakeholders: the promoter, beneficiaries or users, project manager. They all define success differently. Users' interests suffered most because they are the key focus. The fundamental interest to satisfy users' interest mostly defines the project scope and, therefore, their input is key.*

P20: *You need to pay attention to all relevant stakeholders if you are to succeed working on complex projects.*

As the project progresses there is the tendency for more attention to be given to more visible project stakeholders, such as contractors and architects, at the expense of customers and users. Moreover, the inputs of customers may even be ignored at the initial planning stage because of their limited knowledge on technical aspects of the projects. Owing to the limited level of involvement of customers and users when projects face complexities that can alter the initial project scope and deliverables within the project life cycle, project teams usually do not seek inputs from end-users. Consequently, project complexity, and its resultant project failures, affect customers and end-users more than they affect the other stakeholders on the project.

The findings revealed the important role end-users and customers play in ensuring project success and further demonstrated that these groups of stakeholders are the most affected when project scopes change, or the project fails. Deeper and more coordinated user involvement is therefore central in every step of the project life cycle, especially at the project initiation stage. Because end-user/customer satisfaction is a key criterion in measuring project success, it is not surprising that the neglect of user interests makes them the most affected by project complexity. Duodu (2017) identified poor end-user management during the project life cycle as the main aspect of complexity in the Ghanaian construction industry. Similarly, Shah (2016), in explaining the causes of project delays among construction companies in Ghana, noted that many construction firms and project sponsors underrate the end-user issues relating to the project in the planning and execution phases of projects because construction firms are focused on the financial benefits of the project to the neglect of the user experience. Fugar and Agyakwah-Baah (2010), for instance, explain that this is the primary reason why the value of end-user experience in rented properties does not match the prices users pay for them.

However, with the evolution of project management knowledge areas, stakeholder management and engagement have become an indispensable part of project management, because project stakeholders can influence the success or otherwise of a project (Karlsen, 2002; Rowlinson & Cheung, 2008; Saad et al., 2020). The incorporation of proper stakeholder management and engagement at the early stages of projects can be a significant contributor to project success, which is not common among ongoing projects in emerging economies.

7.2.3.4 Concluding thoughts for theme 3

As a result of the complexities created by interactions and dependencies, project managers and project teams need to develop a mechanism to engage and manage multiple stakeholders on complex projects to achieve project success. The findings revealed that the huge number of stakeholders involved in complex projects, along with their resultant interaction and interdependencies, account for the negative relations between complexity by interaction and project success. These findings are largely corroborated by other findings on project complexity and success. Findings by Ahern et al. (2014), Geraldi et al. (2011), Lu et al. (2015) and Bozan de Rezende and Blackwell (2019) in other jurisdictions also suggest similar reasons for the interactional effect between project complexity and project success. These findings explain why project complexity had a positive relationship with project success and some project success dimensions.

While the findings of this study provide areas of thought to project management practice in Ghana, it first and foremost exposes researchers and practitioners to the realities of project management in Ghana's construction industry. Like the study by Fugar and Agyakwah-Baah (2010), this study affirms the idea that the causes of delays in building construction projects in Ghana are a result of the complicated nature of the interaction and the dissonance of the independence between project teams and stakeholder needs and interest. As confirmed by the participants in the Ghanaian construction industry when managing complex projects, the lack of appropriate systems and processes and less user-focused engagements are the chief causes of interactional complexity.

In construction projects, various primary and secondary stakeholders are involved, and each stakeholder is uniquely involved in the project (Mok et al., 2017). Every stakeholder within the project environment has some expectation from the project and it is important to manage stakeholders to avoid potential influences that can adversely influence project outcomes. Another important reason why stakeholders should be properly managed is that stakeholders can provide relevant contributions to the project that can ensure successful outcomes. Stakeholder involvement can therefore be assessed based on their potential to threaten the project or to collaborate with the project. Supportive stakeholders can be low in the potential to influence projects but can be high in providing collaborative efforts. Supportive stakeholders are ideal stakeholders who support the goals and activities within the projects, such as consultants, financial institutions, and suppliers (Karlsen, 2002; Rowlinson & Cheung, 2008; Saad et al., 2020). Some stakeholders also have a high potential to influence project outcomes but may be low on the potential to collaborate. Stakeholders who largely do not support the project

goals and objectives, such as labour unions, public authorities, and community members, may constitute the most distressing factors for the projects. In dealing with the various stakeholders, identifying the depth and nature of the influence of the stakeholders and the level of embeddedness within the project can be useful in facilitating stakeholder engagement and communication,

7.2.4 Theme 4: Transformational leaders' focus inspires team members and stakeholders which promotes successful project outcomes.

7.2.4.1 Subtheme 4.1: Transformational leadership inspires project teams to achieve success by providing direction and empowerment.

The participants agreed that leadership is an important element in the project management process. At every stage of the project life cycle, project teams and stakeholders must be guided by means of leadership to ensure that projects meet standards and expectations. Many participants asserted that, based on their experience, leadership attributes akin to transformational leadership had proved to be the most effective at engendering project success. They reason that transformational leaders provide vision and a strong sense of mission to complex projects that engender pride, trust in laid-down systems and processes, and elicit buy-in from project teams and project stakeholders.

> P11: *Transformational leaders are vision-bearing and this leadership by example influence the project team positively. They also actively engage in the work which encourages the team to work for successful outcomes.*

> P3: *One key ingredient in transformational leadership is being visionary. Because they encourage people to achieve more.*

Leadership is about influence and a potential source of influence is the charisma of the leader. The participants stated that charisma of the leader induces trust, respect and admiration from project team members. As such, the project teams begin to see the actions of the leader as exemplary and therefore worth emulating. The participants were of the view that when the leader is transformational that leader understands the needs of the project teams and considers the well-being of teams in their actions and decisions, and this positively influences the project team to do more. For instance, respondents asserted that the leaders' ability to communicate a precise vision and provide directions creates a guiding coalition and removes ambiguities from project teams concerning important tasks and deadlines. The participants were of the view that when leaders are transformational, they lead in identifying goals, design appropriate strategies to achieve project goals, and provide direction and

motivation for project teams so that agreed-upon goals can be attained. Such leaders, according to the participants, recognise the value system that operates in a variety of workgroups and situations, and both listen to questions and provide answers. Again, the participants stated that transformational leaders demonstrate an understanding of the difficulty associated with the project as felt by project teams. In this respect, the transformational leader provides direction, co-ordinates the activities of the individual project members constituting the group and ensures consistency. This finding is corroborated by a study by Zaman et al. (2020), who advance that transformational leaders promote a common vision and engender total buy-in from their subordinates, which positively influences the organisational culture and project outcomes. The opinions expressed by participants included:

> P12: *Because transformational leaders empower people and bring everybody on board. They are clear and guide all stakeholders to successful outcomes.*

In addition, the participants shared the view that the ability of the transformational leader to reach out and consult project team members and other external stakeholders during difficult periods, especially in the project execution phase, helps to gain buy-in and commitment among all stakeholders to see projects through. This is strongly linked with the idealised influence trait of transformational leaders, which explains the inherent ability of transformational leaders to develop and communicate a compelling vision to their followers. The compelling vision elevates followers to the point where they are motivated to achieve tasks and advance organisational goals with little guidance from their leaders. Some comments from the participants were as follows:

> P.7: *When things are not going on as planned, the manager makes us understand the situation and, collectively as a group, we determine the way forward.*

> P11: *The project manager likes to bring everybody on board in solving problems. It makes all feel valued and this can be quite motivating*.

The project leader makes an effort to connect with project team members at an emotional level through gestures, words and actions that make project teams feel motivated. This attribute espoused by transformational leaders creates a positive perception in the minds of teams and stakeholders and fuels a long-lasting interest in the project even in the face of complexities.

7.2.4.2 Subtheme 4.2: Leaders who encourage, and are supportive of the teams need, get the team to do more, leading to successful outcomes.

The participants were of the view that the actions of the project leader that inspire their project teams and create room for their personal development motivate project teams to do more even in the face of complexities. Participants averred that transformational leadership is central to capacity-building among project teams. The participants indicated that when leaders create project environments that encourage learning and support innovation through coaching and mentoring it encourages project teams to extend themselves in the midst of difficulties, and this enhances project success outcomes. Again, the participants were of the view that when leaders approach mistakes on projects as an opportunity to guide their project teams towards better and improved performance, this builds the confidence of project teams and can lead to successful project outcomes. Some comments from the participants were as follows:

> P10: *Project teams seek to advance their career goals and so they seek opportunities that are challenging and can help them develop their unique skills. Personal development cannot be ignored.*

> P12: *When your leader genuinely seek your growth and development, it is normal to reciprocate by working hard to help achieve successful project outcomes*.

According to some participants, individuals on project teams are likely to make mistakes when carrying out tasks. The participants therefore mentioned that project managers who encourage team members to learn from their mistakes and support team members to develop through their mistakes without the fear of punishment inspire project teams to contribute towards meeting project milestones and to develop themselves at the same time. The participants further added that when leaders inspire confidence and allow individuals to develop innovative solutions to solve problems that are encountered on projects this builds the project team's confidence and enhances project outcomes. The participants were of the view that individualised consideration is present when a leader delegates assignments and stimulates and coaches project teams on an individual basis. Ultimately, because of the attention transformational leaders pay to the personal development of members of their project team, they create project environments that allow members of the project team to exhibit high levels of energy and mental resilience while working. This is seen in project teams' willingness to invest effort in their work, while persisting even in the face of difficulties. Some comments from participants were:

P1: *When leaders delegate and genuinely show concern for the growth and development of followers, the followers give of their best in the execution of their work, and this enhances project outcomes positively.*

P5: *The willingness of leaders that use the transformational leadership style to help followers learn and succeed motivates the followers to do more.*

P9: *The transformational leader stimulates your intellect to think outside the box. They give you room to make mistakes and also trust and empower you. This builds the team's confidence. They support well and encourage positive competition.*

P17: *The reason why transformational leadership styles enhance project outcomes is that transformational leaders believe in people and boost morale, and this makes a lot of difference to followers' commitment.*

Para-González et al. (2018) contended that transformational leaders support project teams and thereby enhance task performance, staff satisfaction, and project success. Transformational leaders also emphasise collaborative efforts among all stakeholders on project teams. Transformational leaders inspire project participants to be more innovative, solve problems, collaborate, and go the extra mile in delivering a project successfully (Kissi et al., 2013; Sohmen, 2013). Yizhong et al. (2019) also found that transformational leaders can create harmony in the team, which contributes to successful project outcomes. For many individuals in project teams in the Ghanaian construction industry, the quality of the relationship they have with their leaders pushes them to be fully concentrated and committed to the objectives of the project and the leader (Bhatti et al., 2021).

7.2.4.3 Subtheme 4.3: Transformational leaders encourage and stimulate project teams to do more in difficult project situations, thereby improving project outcomes.

The participants mentioned that transformational leaders are able to stimulate their project teams to go above and beyond their required tasks and responsibilities. The nature of project environments, especially in construction, requires that project teams are driven beyond the tangible rewards provided for their work (Gangolells et al., 2010; Zhang et al., 2018). Participants indicated that project teams usually demonstrate this through their eagerness to undertake tasks voluntarily and successfully, even in the face of serious complexity.

The participants indicated that leaders who are transformational do not stick to the everyday norms of the project. Rather, such leaders embrace new ways of solving problems which focus on the inputs of project team members. Transformational leaders, according to the participants, are supportive and allow the project teams to bring out their own unique ideas in the course of the project. Some participants commented as follows:

> *P8: Concerning project team dynamics, the ability to stimulate and provide regular encouragement is an essential element to success which transformational leaders provide*.
>
> *P9: Transformational leader stimulates your intellect to think outside the box. They give you room to make mistakes and also trust and empower you. This builds the team confidence. They support well and encourage positive competition.*
>
> *P16: Project success does not come from one person. It needs a concerted effort. Projects have several legs, and all legs are needed, and transformational leaders are able to stimulate, inspire, motivate and this trickles down to every person leading to success. The trickling effect can permeate the entire fabric of the organisation and the organisation can experience success.*

Transformational leaders within the project environment are able to provide a conducive environment that encourages team members to be innovative. Transformational leaders however provide ample supervision to project teams, but without unnecessary interference. Mistakes are common in the project environment. When mistakes are encountered, the transformational leader perceives the mistake as a teachable moment. Rather than punishing project team members, the transformational leader gives the team member the chance to work towards the right course of action and in the process builds the confidence of the project team.

Hassan et al. (2017) posited that followers are influenced by leaders who exhibit and engender a strong cognitive and emotional drive. This characteristic is akin to the intellectual stimulation dimension of the transformational leadership style. Thus, project leaders who exhibit transformational traits create a special connection with members of their project team and this connection allows leaders to challenge expectations while stimulating and encouraging creativity in project teams. As Naeem and Khanzada (2017) note, the nature of the construction industry requires leaders who are able to galvanise their project teams at a cognitive level to see beyond the challenges encountered on the project. At an emotional and physical level, project teams can develop an attachment to the project to care enough about its success and strive to get tasks completed beyond the tiredness and

fatigue associated with the challenges of projects. According to Willow (2012), transformational leaders are best suited to provide the kind of stimulation that pushes project teams to challenge the existing values, traditions, and culture in general to engender new and better ways of tackling problems and carrying out tasks. The ability to stimulate team members is an essential leadership characteristic important in managing interdependencies between various tasks and stakeholders. Participants also averred that transformational leaders provide support and guidance to project teams during crises. The support and guidance inspire project teams to strive towards project success, even when crisis looms.

7.2.4.4 Concluding thoughts on theme 4

The findings of the study show that transformational leadership has significant influence on project team development, motivation, and commitment, resulting in successful outcomes when working on complex projects. This finding is in agreement with the study of Famakin and Abusiga (2018), which found that transformational leadership style has significant impact on the commitment of employees, which in turn affects the success of projects embarked on. In addition, Famakin and Abusiga (2018) asserted that a supportive leadership style influences the affective commitment of employees and the continuing commitment of employees. Similarly, Zhang et al. (2018) noted that, because of the transformational leader's focus on developing relationships, project leaders are more effective in inspiring their project teams to commit themselves and perform at the optimum level to ensure that projects are delivered successfully. The findings of this study provide evidence that transformational leadership is important for project success because transformational leadership is conducive to long-term project success and provides a more holistic approach to achieve project success. Project managers who employ transformational styles guide, motivate, inspire, mentor, and build teams. The findings of the study attest to the fact that, when leaders empower project teams and are supportive of project teams even when they make mistakes, this gives project teams the opportunity to learn from their mistakes, builds their confidence and enhances their capacity to contribute effectively to the outcomes of complex projects.

The findings indicate that transformational leaders can influence project teams to strive beyond their required duties and to go the extra distance to ensure that project goals are achieved. The findings show that transformational leaders attach some level of importance to the individual needs of project teams which makes them feel valued. Focusing on the personal needs of project team members acts as a catalyst for more engagement from project teams. It emerged from the findings that when

managers focus on building the capacity of project teams, projects become more meaningful to project team members, which can then drive them to push for more progress. The absence of immediate punishment for mistakes allows project teams to be creative in solving problems outside of conventional alternatives. The assurance of fewer punitive actions for mistakes can be a confidence booster for project teams to test and experiment with novel solutions. The role of the leader would be to foster and encourage the project team by providing guidance and directions. The implication is that project teams are left to explore within a controlled and guided environment, which means that mistakes are largely corrected. As a result of the personalised involvement of the project leader with project teams, project leaders are positioned to know and understand the strengths and weaknesses of each project team. The implication is that project tasks and activities can be properly assigned based on weaknesses and strengths which can minimise mistakes and enhance the chance of achieving more successful project outcomes.

7.2.5 Theme 5: Ethical leadership builds trust which positively enhances project outcomes.

7.2.5.1 Subtheme 5.1: Ethical leaders insist on professionalism and demand strict moral standards.

Participants mentioned that ethical leaders are the moral compass that guides the project team and ensures that members of the team fulfil their roles. By exhibiting exemplary behaviours, ethical leaders insist on the highest level of professionalism and demand that the right things are done all the time (Matloob, 2018; Xu et al., 2016). Ethical leaders place a premium on adherence to laid down standards and professionalism and expect the same from the project team. The interest of ethical leaders in results equals their interest in the process, which implies that project teams do not have the opportunity to cut corners in the performance of their tasks (Matloob, 2018; Xu et al., 2016). Some participants further claimed that ethical leaders on project teams stipulate consequences for exhibiting unacceptable behaviour, while rewarding members of the project who insist on doing the right thing. This follows from the point that ethical leaders understand that individual and collective actions have greater consequences on the future outcomes of projects and thus are careful to ensure that every member of the project team does what is considered lawful and legitimate. As such ethical leaders take serious exception to behaviours that are considered self-seeking, immoral, and illegitimate.

The participants stated that when project leaders are ethical, they are well-positioned to apply sanctions because of the legitimate power they possess, their control of resources, and their responsibility for important decisions about project teams. Responsibility for important decisions positions the ethical leader in a place of power and influence. The ethical leader demonstrates a good

use of power by leading through openness and transparency. The ethical leader is aware that their actions must be transparent at all times, which creates a conducive environment that minimises the potential incidents of corrupt practices. Further, project leaders have the opportunity to create a just project environment by making decisions that are perceived by project members to be fair. Aside from leader behaviours reflecting a concern for people and fair treatment of project members, ethical leaders go beyond fair treatment to include principled decision-making, setting ethical expectations for followers, and employing rewards and punishments to make project members accountable for their conduct. Introducing and implementing rewards and punishments are the ethical leader's way of reinforcing an ethical ethos in the project team. The following assertions were made by participants to confirm this:

> P5*: Ethical leaders instil discipline in followers and show the way. They make clear the do's and don'ts and are fair and consistent. They train followers in areas to be ethical and emphasise the importance of leading by example.*
>
> P10*: When leaders show ethical behaviours, it sets an example and follows emulate the follow. This is because ethical leaders minimise the complexity of corruption, and that level of transparency improves project outcomes.*
>
> P13*: This is because they are more professional and do not cut corners. They follow well, ethical processes and never shift the post and they expect the same from their subordinates. They have honesty and truthfulness. They want to know they can trust you to do what is right, so they start by showing you that they also do the right thing.*
>
> P14*: Project manager has power to punish and reward and that power can be used to serve the interest of the project or for personal gain The ethical leader makes that conscious effort to use his power to punish and reward for the good of the project through fairness and deep concern for the well-being of project members.*

Based on the assertion of Brown et al. (2005), ethical project leaders exhibit relatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through two-way communication, reinforcement, and decision-making. Such reinforcement either through punishment and rewards inadvertently motivate project teams to ensure high standards through conduct that is within stipulated rules and ethos set by the project manager throughout the project life cycle and especially when the project faces difficulties. Joslin and Muller (2016) agree that leaders who are proponents of strong ethical cultures and systems create a

conducive environment to achieve project efficiency, stakeholder satisfaction, project impact, and overall organisational benefits.

7.2.5.2 Subtheme 5.2: When leadership is fair and open, it builds the team's trust and promotes successful project outcomes.

Participants were of the view that when leaders deal with all stakeholders with transparency and fairness, project outcomes tend to improve significantly. For many participants, project leaders who exhibit ethical traits bring a lot of fairness and integrity to their work which inspires project teams and stakeholders to follow their positive example. The participants stated that when leaders are perceived as having a broad ethical awareness and concern for all stakeholders, which includes employees, they are likely to promote successful project outcomes. The participants indicated that project managers who demonstrate ethical leadership consider the needs and rights of project members and stakeholders and treat them fairly. As a result, stakeholders are more willing to work with them and give of their best. Participants commented as follows:

P.11 The ethical leader gives attention to the needs of project team members. Ethical leaders encourage participation, and this enhance communication when issues arise.

P 14: When leaders are fair, transparent, and do not abuse the rights of subordinates, they serve as good role models and elicit dedication and commitment from project teams.

Owing to the premium that ethical leaders place on the values of fairness and transparency, they often consider all interests at stake before making project decisions. This level of openness and interest in project teams by ethical leaders promotes successful outcomes even in difficult project situations.
Participants explained that trust among stakeholders can engender supportive behaviours from stakeholders. Trust is important especially when project teams encounter difficult situations, because trust provides assurance that the project leader will make the right decisions. Therefore, in project environments, the demonstration of ethical traits by project leaders leads to unity of purpose and higher performance. This is because project stakeholders can model the exemplary behaviours of the leader.

Some of the participants' comments are presented below:

P2: *The influence of the ethical leader has served as a deterrent to doing bad and unethical things. Being such good models makes work well.*

P16: *Ethical leaders' lives are melodious; they sing harmoniously. I strongly agree with this. Human beings in nature believe in fairness and once they experience fairness they respond positively. Leading by example influences all to do the same. The conduct of the leader matters because it seriously influences followers to do the same as the leader. Failure and corrupt practices lead to failure. Unethical leaders sow discord and can be unfair and these demotivate project teams.*

P19: *Generally, where integrity, fairness, transparency abounds, it creates an accepting environment that impacts teams' commitment positively. Leading by example truthfully has an impact on followers to commit and do more.*

In confirming these findings, Podgórska and Pichlak (2019) asserted that modelling characteristics, such as diligence, inspiration, sensitivity, achievement, fairness, and great communication, which are attributes of transformational and ethical leaders, are associated with project success. In addition, ethical project managers lead with empathy and provide support to project teams that help project teams to perform at their best. Also, in support of the work of Doan et al. (2020), this study found that when leaders lead by example, are fair, and create a conducive work environment they are likely to achieve successful project deliverables, even in the face of challenges.

7.2.5.3 Subtheme 5.3 Ethical leaders lead by example by modelling hard work for project teams to emulate, with the potential to improve on poor project outcomes.

Some participants believed that individuals learn more from the actions of their project leaders than they do from their words. Hence project leaders who demonstrate high ethical character provide examples for members of their project team. The participants indicated that when projects are in a difficult phase, project teams look up to ethical leaders because of the exemplary attitudes and behaviours they exhibit. The participants also pointed out that when project leaders insist on professionalism, fairness, transparency, and ensure that the right things are done even in the face of complexity, project teams tend to emulate these behaviours when tackling complexities that arise in the performance of their assigned tasks. The participants also indicated that ethical leaders are seen as role models of productive conduct and demonstrate fairness, honesty, and trustworthiness. Furthermore, ethical leaders, according to the participants, demonstrate care and concern for project

members, which makes them approachable and also wins the unparallel commitment of project teams. The participants also held the view that project members can engage with the ethical leader concerning problems, with a firm assurance that the leader will provide solutions to the problems and concerns. Some views of participants on ethical leadership affirmed the important role of ethical leaders in contributing to successful project outcomes. A number of participants' views follow:

> P1: *On difficult project situations such as dealing with technical challenges and having to meet demanding deadlines, how ethical the ethical behaves matters … Also ethical leaders really care and win project teams' commitment.*
>
> P3: *The moral compass of the ethical leader energises their people to do more. They are respected and people like to please them by working hard. Doing the right thing, people like to follow, and they do the same.*
>
> P8: *Ethical leadership demonstrating moral behaviour serves as an example followers emulate, which enhances project outcomes. When leaders show ethical behaviours, it sets an example that project teams follow, often leading to successful outcomes.*
>
> P19: *Generally, where integrity, fairness, transparency abounds, it creates an accepting environment that impacts teams' commitment positively. Leading by example truthfully has an impact on followers to commit and do more.*

Overall, the behaviour of the ethical leader enables project members to positively identify with and be loyal to the project and engage in extra-role behaviours which enhance project outcome.

The findings of this study confirm the findings of research done by Qi and Ming-Xia (2014), which suggested that employees may learn exemplary behaviour from the leader by engaging in those behaviours observed about the leader that are considered acceptable, while eschewing those that are not exemplary. This explains why ethical leadership styles engender better project outcomes in complex projects. Ethical leaders set high standards for performance and, by taking a lead in achieving these standards, they serve as role models to their project teams in the face of project challenges. Furthermore, the findings of this study are corroborated by studies conducted by Anantatmula (2010), Mugal et al. (2019), Tysen (2014), and Aga et al. (2016). Anantatmula (2010), in explaining the important role that ethical leadership plays in complex projects, postulated that the ability of project leaders to establish trust is essential for team members' collaboration, knowledge-sharing, and effective managing of uncertainties or complexities on a project.

7.2.5.4 Concluding thoughts on theme 5

The study findings suggest that project team members would certainly not be willing to follow a project leader who is perceived to be dishonest and who can engage in exploitative behaviours. Evidently, low levels of trust can influence relationships and lead to political strife, infighting, and general inefficiency and ineffectiveness. Project environments with little or no trust have no basis for future success. Therefore, within the project environment, project managers and leaders cannot separate the issue of trust from their dealings.

The findings are relevant to emerging economies because the failure of construction projects in emerging economies can be traced to corruption, and lax institutional and regulatory frameworks for construction activities (Daniel & Ibrahim, 2019). Also, instances of political interference and lack of accountability and transparency in government construction projects mean that government officials are able to engage in corrupt practices that lead to cost overruns (Daniel & Ibrahim, 2019). Ethical leaders are the moral compass that guides the project team and ensures that members of the team fulfil their roles. The findings reveal that by exhibiting exemplary behaviours, ethical leaders in the Ghanaian construction industry insist on the highest level of professionalism and demand that the right things are done all the time. The findings of this study are corroborated by studies conducted by Anantatmula (2010), Mugal et al. (2019), Tysen (2014), and Aga et al. (2016). Ethical leaders' insistence on fairness, transparency, and for the right things to be done even in the face of complexity quite naturally inspire individuals under their leadership. In response, project teams tend to emulate the ethical behaviours of the leader when tackling complexities that arise in the performance of their assigned tasks. Qi and Ming-Xia (2014) intimate this position firmly by insisting that employees will involuntarily learn the positive behaviours of their ethical leader by engaging in those behaviours observed about the leader that are considered acceptable, while eschewing those that are not exemplary. This explains why the ethical leadership approach engenders better project outcomes when projects face complexity.

7.2.6 Theme 6: When leadership is preoccupied mainly with technical aspects of the project, successful project outcomes are not promoted.

7.2.6.1 Subtheme 6.1: Transactional leaders focus more on work than people's needs, and therefore, do not motivate project teams enough for successful project outcomes.

Participants revealed that project leaders who exhibit transactional leadership skills often struggle to motivate their project teams. The reason is that unlike transformational leaders who are as much interested in team needs as the results, transactional leaders' primary focus is on results which occur

at the expense of the intrinsic needs of project members. Some participants made the following comments:

> P17*: Transactional leaders emphasise work without believing in people and that is the problem. They [transactional leaders] have no relationship with the team but only focusing on the job. People don't go the extra mile.*

> P18*: If, as a leader, all you care [about] is work outcomes, then certainly [you] can't [expect] much from me because [its] like I don't exist*

Transactional leaders do not induce a lot of enthusiasm and energy from project teams because of their lack of support for project teams. A participant passed this comment:

> P5: *Because they do not impact positively [on]dealing with people. They tend not to be involved in projects. They don't normally lead by example. If you disrespect people and you are not supportive at the human level, it will not work. Care for people and their interest is key to succeeding. Not showing interest in followers' welfare can lead to a lack of commitment from followers, leading to project failures. They do not lead by example.*

The fact that transactional leaders do not emphasise establishing a relationship with the team members, they gain less from project teams. Furthermore, the effect of not becoming involved in project teams is that project teams may feel demoralised, and this can also be a signal to the team members that the leader does not believe in them (Aga, 2016; Tyssen et al., 2014). The absence of belief also implies that the leader potentially does not expect much from the team members. Typically project managers who have no belief in their teams do not provide more of their time, energy, and resources for the team.

Transactional leaders further rely on financial benefits as the means of motivating their teams. However, not all individuals are motivated by money. Money can serve as a motivator to the extent that it satisfies an individual's personal goals. Money can therefore drive project teams to perform given that it indirectly satisfies a need. However, project managers who are in search of more enduring and self-sustaining factors that can drive project teams to perform cannot wholly depend on money. Focusing only on money provides a partial solution to the motivational concerns of employees and the organisation owing to the transient nature of behavioural and attitudinal changes driven by money. At best, in respect of project teams, the absence of money as a motivator may lead to some inconveniences but it may not motivate when in excess. The effect of money is therefore limited and

not sustainable. To get the most out of project teams, especially during turbulent and chaotic times, project managers must combine financial motivators in addition to other intrinsic motivators to ensure sustained performance. More importantly, individuals seek personal progress and accomplishments in the long term. These come from opportunities that are given to project members by working in teams. A participant commented as follows:

> R20: *When the objective is for immediate gain, it becomes personal and not focusing on the overall objective of the project. Transactional leadership generates individual success but not team or collective success which is fundamental to the success of complex projects.*

This finding corroborates previous research by Tyssen et al. (2014), who argue that transactional leadership traits are only effective on short-term projects. Transactional leadership might have positive effects on project efficiency in the short term, but it will negatively affect project outcomes. The finding also supports previous research by Trivellas and Drimoussis (2013), who advance that transactional leaders largely concentrate on tasks and the use of exchanges and bargains to influence followers towards goals and achieving objectives. Transactional leadership is about exchanges between a leader and project team, where leaders specify and offer rewards in return for performance with minimum emphasis on investing in relationships and creating a supportive environment.

7.2.6.2 Subtheme 6.2: Project teams tend to do just enough, which may not be good enough in difficult project situations.

Some participants mentioned that the transactional leadership approach is not concerned with establishing relationships. Rather, transactional leaders are concerned with fulfilling task obligations. Often, the absence of a relationship can render project teams less confident and more inclined to believe that project managers have no interest in the well-being of project teams. Participants stated that transactional leaders tend to link a given task to extrinsic rewards as a means of getting project teams to perform. However, within the project environment, project teams' responses to transactional leadership are to provide optimal performance even when teams are capable of expending more effort. The participants further stated that when leaders are transactional it often affects project teams' eagerness to engage voluntarily in extra activities or to go the extra mile on projects.

Transactional leaders, especially in project environments, focus on the role of supervision, organisation, and group performance. Transactional leadership promotes the compliance of followers

through rewards and punishments, and this does not engender active commitment among project teams (Prasad & Jumi, 2016). The unwillingness of project teams to fully engage points to significant issues of weakness of transactional leadership. Transactional leadership does not provide the needed support that is highly valued by project teams.

Some participants commented that:

> P16: *Project team members respond to this style of leadership by doing just enough in line with goals without doing more.*
>
> P17: *Transactional leaders emphasise work without believing in people and that is the problem. They have no relationship with the team but only focuson the job. People don't go the extra mile.*
>
> P18: *If a project leader is preoccupied with compliance and results without genuine interest in project teams, you will only get just enough results.*
>
> P20: *It is not surprising that project team members do not go the extra mile working with transactional leaders, because there is no cordial relationship between such leaders and project teams. They are too much focused on extrinsic results.*

It emerged from the participants that transactional leaders pay attention to followers' work to find faults and deviations rather than to recognise the development of individuals. Consequently, creativity and personal initiative are stifled under transactional leadership and project teams tend to lack the motivation to voluntarily perform tasks that are not required even if the performance of such tasks help the team to achieve project goals more quickly (Mugal et al., 2019). Mugal et al. (2019) conceded that under transactional leadership, especially management by exception (passive), individuals on project teams are more focused on not making mistakes than on finding the best solutions for problems. Hence, they are only motivated to perform to meet just enough, or the minimum requirements on the project.

7.2.6.3 Concluding thoughts on theme 6

The findings show that transactional leaders are limited by the use of reward-based behaviours to achieve higher performance from project teams. These have only short-term effects. The transactional leadership approach results in project teams having to perform to meet the minimum requirement on

projects without going the extra mile. Generally, leadership has the greatest potential to influence the feelings and attitudes of project team members through the provision of a supportive environment in which team members may feel safe to fully engage in project tasks. However, the findings from this study suggest that project teams are unlikely to extend themselves to ensure successful project outcomes. This is because the primary focus of the transactional leadership approach is not on building effective and cordial relationships among project teams but is driven by achieving extrinsic results at all costs. Project team members must have a supportive work environment to complete their work, but transactional leaders are less inclined to provide this.

The findings related to this theme provide evidence that indicates that the transactional leadership style is the least influential among the three leadership styles (transformational, ethical, and transactional) in ensuring positive project outcomes. The findings reveal that the transactional leadership style has the least effect when projects experience complexity and thus do not engender success. An even more significant finding is that the transactional leadership style has been shown to be ill-suited for the complex construction environment in developing economies. This finding is in line with studies by Famakin and Abusiga (2018), Oh et al. (2019), Raziq et al. (2018), among others. However, Zhang et al. (2018) noted that, because of the contingent reward characteristic of transactional leaders, transactional leaders are effective in projects that have short project durations and are uncomplicated.

7.2.7 Theme 7: Fulfilling the project leadership roles tends to promote project success.

7.2.7.1 Subtheme 7.1: The majority of project leadership roles foster good relationships, and build, inspire, and enhance successful project outcomes.

Participants revealed that leadership roles that focus on satisfying the needs of team members can provide support to project teams when projects are complex. Better outcomes are ensured when managers perform roles that build positive relationships with project teams. The participants were of the view that direction-setter, compassionate anchor, ethical tone-setter, integrator, and catalyst of possibility are roles that empower project teams. A participant mentioned that these roles are similar to some of the dimensions of transformational leadership which seek to inspire, mentor and empower followers to achieve set goals. Some of the responses of the participants are given below:

> P17: *Project leadership roles moderate well because they are largely dominated by people skills, and this is the reason. The project role offers good people skills and shepherds the team well towards successful outcomes. This is because these roles come with leaders showing*

respect and belief in project team members and this is very important and makes a difference. In addition, these roles come with the leader being open, gives a listening ear to people and being tactful. This is the reason.

P11: *These roles bring together essential elements for human development. The different facets address unique challenges that come with projects and the composite elements are likely to make it work. The roles are the essential qualities to successful project outcomes. The listed project leadership roles are fundamental to getting people to go the extra mile; no wonder this improved the relationship.*

De Klerk (2014) argued that project leadership roles guarantee positive project outcomes even in the face of extreme project complexities. De Klerk (2014), like other researchers, makes a strong case for the moderating influence that project leadership roles bring to the project complexity–project success relationship. For instance, project leaders who provide a strong vision (direction-setter) are adept at guiding their project teams to deal with complexities associated with change and ensuring project success (Herold et al., 2008; Senaratne & Samaraweera, 2015). Project leaders who encourage creativity and innovation (catalyst of possibilities) are excellent at dealing with complexities that are novel and unique to project teams (Atkinson et al., 2006; Uhl-Bien et al., 2007). Similarly, project leaders who provide support and consideration for team members' individual needs and concerns (compassionate anchor) will build team trust and commitment as well as enhance collaboration to overcome various forms of complexities on the project, thus ensuring project efficiency, team satisfaction and customer satisfaction (Emery & Barker, 2007; Tyssen et al., 2014). In addition, when leaders define roles, clarify goals, use consistent processes, and actively monitor the performance of team members (orchestrating driver), they can reduce ambiguity, reduce conflicts, and guide the plan of the project, which helps reduce complexities in known task processes and interactions, leading to project success (Anantatmula, 2010; Senaratne & Samaraweera, 2015).

7.2.7.2 Subtheme 7.2: The energiser and mobiliser role is only effective when leaders are knowledgeable, have the expertise, and are tactful in their application.

The quantitative part of the study found that the energiser and mobiliser roles did not moderate the relationship between project complexity and project success. According to some participants, the energiser mobiliser role did not act as a moderator because in the Ghanaian context, project teams like to see their leaders act rather than speak. In the project environment, project teams benefit a great deal from having effective leaders in place to act as guides during challenges. Project teams look

up to the leader for inspiration, direction, and encouragement. Beyond the fulfilment of these roles, project leaders are required to act as examples and to influence project teams through participatory behaviours that are visible to project members.

> P19: *In isolation, I will say yes because being optimistic and enthusiastic alone without the other roles like being visionary, knowledgeable [and] innovative cannot guarantee success. You may have the energy but [it] may not go down to the team. Optimism and enthusiasm without knowledge do not go far. You need to have much more than being enthusiastic and optimistic.*

Leading by example implies that project managers guide project members through their actions and further inspire project teams to emulate the exemplary actions of the project manager. When project managers lead by example, they create a path to direct the project teams in order to collectively work towards project goals. Hence, project managers who merely show optimism and enthusiasm without following it with actions may not get the desired reaction from their project team members. Consequently, showing optimism and enthusiasm without a clear course of action would not lead to specific positive reactions from the project team that could minimise the negative effect of project complexity on project success.

> P2: *Exemplary leadership influences project teams more than one can imagine … Action speaks louder than words.*

> P 16: *Show me what you can do, not mere talk. Projects are more about doing than saying.*

The outcome of leading by example is that it inspires trust and respect, confidence, and unity of purpose within the project. Project team members may consider a manager who leads by example as having the ability to truly understand the project and the activities involved. This can create a culture of trust and further set the project manager as a role model for hard work. Team members would be willing to follow the efforts of the project leader and be as hardworking as the leader and strive to accomplish the goals of the project. The project leader can further inspire the project members to develop more effective processes through which project goals can be achieved. Some of the responses of the participants are presented below:

> P16: *Energiser and mobiliser cannot improve the relationship between project complexity and project success because although it is important in managing complex projects, it is better*

when it is supported by the other roles, like being knowledgeable, so that it's not a case of zeal without knowledge.

P.13*: To really have an influence on team members, managers must rely on actions that are demonstrated, not mere rhetoric.*

The findings show that the capacity of leaders matters in leading project teams. Much as motivating and energising project teams to do more on projects are essential, these will only be complete when the leaders lead by example. When leaders lead by example and show followers by their actions, this tends to have significant impact on followers' commitment and this can positively enhance project outcomes (Raziq et al., 2018). The idealised influence dimension of transformational leadership, which refers to a leader's behaviour of active engagement on projects, stirs up strong emotions from followers to engage in similar positive behaviours (Zaman et al., 2019). It is not unreasonable to speculate that there is some similarity between the project leadership roles in comparison with the dimensions of transformational leadership, and that could also explain the reason why the project leadership roles moderated the relationship between project complexity and project success just as transformational leadership did.

7.2.7.3 Concluding thoughts on theme 7

From the findings it is clear that better outcomes are ensured when managers perform roles that build positive relationships with project teams. The different project leadership roles make significant contributions generally to project success. While all the project leadership roles are relevant for project environments, complex projects make it necessary for project managers to go beyond project leadership roles, by supporting such behaviours with the knowledge and expertise required on the project. Project managers who perform only project leadership roles but lack technical knowledge are less likely to provide the resources needed to help their project teams throughout the project life cycle. Project leadership roles like direction-setter, compassionate anchor, goal orchestrator, ethical tone-setter, integrator, and catalyst of possibilities were found to have a significant influence on project complexity and project success in the Ghanaian construction industry and thus project teams will be better equipped when their project managers play these roles.

More significantly, when project leaders demonstrate optimism and enthusiasm which characterises the energiser and mobiliser project leadership role, it was found to be less effective in the Ghanaian construction industry when not matched by expertise and tact. This is because project teams expect support from their project managers and thus expect them to possess a working knowledge on the

various aspects of the project to help offer solutions when challenges arise and not only act as cheerleader for the group. Project managers are expected to lead by example by practically demonstrating to project teams how to handle challenging situations. To do this, the project manager must be well-informed about the project and must be knowledgeable in order to provide and demonstrate technical and hands-on knowledge about the project. Practical involvement of the project leader and the demonstration of knowledge creates trust among project team members to follow the project manager. These findings are corroborated by the studies of Senaratne and Samaraweera (2015) and Cullen and Leavy (2017), who explained that project leadership roles require project managers to build contexts. Particularly, these studies found that the project manager should be able to manage and control the factors in the project context. In addition, these roles require project managers to define roles, clarify goals, use consistent processes, actively monitor the performance of team members, and use their expertise to reduce ambiguity, know task processes, and resolve conflicts.

7.2.8 Theme 8: The relationship between project complexity and project success is not simple.

7.2.8.1 Subtheme 8.1: Experienced project teams significantly influence the relationship between project complexity and project success.

Some participants were of the view that although project complexity can influence the success of projects negatively, the overall outcome of project complexity on project success could be negligible if experienced project teams are involved in the execution of the project. The participants explained that this is because having experienced project teams means having a team that is likely to have been exposed to various project-related challenges and therefore is well placed to tap into their previous experiences to solve challenges that emerge on complex projects. According to the participants, experienced project teams can therefore mitigate the negative effect of project complexity on project success. Some comments from participants were as follows:

> P12: *Experienced project teams working on complex projects have the potential to reduce and mitigate the negative effects of project complexity on project success to an almost negligible level.*

> P15: *Experienced and knowledgeable project teams surely can overcome the negative effects of complex projects and render the overall effects non-existent.*

The ambiguities associated with complex projects are such that there can be sudden surprises that can easily overwhelm inexperienced project teams but having experienced project teams can potentially lead to a reduction of the negative outcomes associated with complex projects. One participant added the following:

> P17: *If you don't have experience, then be ready for surprises. It is not easy at all.*

The participant further stated that the experience of teams plays a major role in reducing the negative influence of project complexity on project success. The participant indicated further that, because experienced project teams usually would have worked on multiple complex projects, they are likely to have encountered a lot of technical and coordination complexities and through those experiences are able to manage such complexity issues better. The participant commented as follows:

> P17: *Experienced project teams working on complex projects that require technical and coordination skills can reduce the negative effects of project complexity on project outcomes*.

The experience gained from dealing with technical and coordination complexities on complex projects helps experienced project teams to find solutions to complexities faced on new projects and thus reduces the overall negative effects of complex projects to an insignificant level.

Some participants commented that hiring or having experienced project teams to work on complex projects comes with benefits but not without costs. When a project has project teams that are well versed in their work, their expertise in dealing with complex issues relating to effective management of teams and solving technical challenges can be expensive. The cost associated with having experienced project teams can lead to reduced financial benefits to firms and may make the overall success of a project insignificant. Some comments from the participants are:

> P18: *Yes, it is possible for project complexity to have insignificant influence on project success because when you hire experienced project teams, they can overcome complex issues, but the cost of having such project teams can erode the financial benefits of the project leading to overall insignificant benefits*.

> P19: *Engaging experienced project teams can be costly and this can reduce the financial benefits of project outcomes*

The participants also intimated that experienced project teams can minimise the negative effect of project complexity on project success, but the overall financial benefits to be accrued to the project can be eroded as a result of the cost associated with hiring experienced project teams. Lehtiranta et

al. (2012) asserted that metrics related to cost are essential project success determinants. Eja and Ramegowda (2020) added to the discussion on the lack of project success in emerging economies by stating that, for example, in Nigeria, construction projects fail owing to cost overruns associated with staff costs, especially consultant charges. When construction firms realise that projects are complex requiring specific technical expertise to address the project complexity, they invest in extra quality resources than would normally be required, to cater for any potential adverse outcome (Hanisch & Wald, 2014; Tatikonda & Rosenthal, 2000). Investing in quality resources, however, has the potential to enhance project success. Nonetheless, the success of a project is also likely to be eroded by the cost of having more skilled people to handle the issues of complexity on the project. With the injection of more resources, the project may be successful, but may increase the project cost and potentially reduce profit margins, and significantly have a negative effect on project success.

7.2.8.2 Subtheme 8.2: The ambiguity around what constitutes success of complex projects makes clarity of achievement of project success difficult.

Some participants stated that describing success can be difficult on complex projects, because it depends on who is defining success. Success from the perspective of a primary stakeholder (those directly affected by the project) may be different from that of a secondary stakeholder (those indirectly affected by the project). The participants were of the view that the conceptualisation of project success even among primary stakeholders, such as project teams, project sponsors and project users, can vary. The participants mentioned that the dimensions of project success are varied. While the project sponsor may be more interested in financial gains, and thus define project success from a financial angle, the project customers may be more interested in how the final project deliverables address their concerns, and the project team's focus may be on delivering to the scope of the project. As such, while one success dimension may be met, for example stakeholder satisfaction, others such as sponsors' expectations may not be met, making success difficult. A participant illustrated by means of an example that a project team may define success as having delivered within agreed timelines and to specifications, but the project sponsor may be concerned about the additional costs incurred in achieving the project outcomes. The users of the project outcomes, who may have been the focus of the project, may not be totally happy with the final project deliverables because the deliverables do not fully meet their needs as a result of their non-participation in the initial conceptualisation of the project. As a result of these varied interests, each of the stakeholders (project team, project sponsor, and users) will define the success of the project differently, thus making it difficult to define overall success. Comments from some of the participants were as follows:

> P12: *It is not all that easy to say for sure that a project has been completely successful. People's definition of success is influenced by their unique interests. Hmmmm … it's not that easy for complex projects.*

> P15: *Defining success in my over 20 years' experience in managing projects can be very difficult, especially for complex projects, because complex projects tend to have more stakeholders and they all tend to emphasise different things when they talk about success …It's not straight forward at all for complex projects.*

The submissions of the participants re-emphasise the complications and the ambiguities that sometimes surround the definition of success of complex projects. The different stakeholders' interests in projects add to the ambiguities associated with success on complex projects. Another participant presented a view on the difficulty of defining success of complex projects. The participant mentioned that, although a project may be completed to agreed quality and cost, if the completion date goes far beyond the originally agreed upon completion date, the users unhappiness can affect how successful the project is deemed to be, despite the fact that some success may have been achieved. This can affect how the overall success of the project is judged. The participant commented as follows:

> P18: *If you deliver to quality, cost, but delay the project completion date it can erode some of the success you may have chalked. The beneficiaries of the project may welcome the project but will not score you 100%.*

This submission aligns with the view that project success can mean different things to different stakeholders (Cooke-Davies, 2002; Rezvani et al., 2016; Serra & Kunc, 2015). Whereas the project team and project sponsor may be happy that a project has been delivered to the required quality and cost, the project users may not be completely happy because of the delays in executing the project. Each stakeholders is likely to define success differently.

7.2.8.3 Concluding thoughts on theme 8

The findings affirm the fact that having experienced project teams is essential in tackling the negative effects of project complexity on project success. The findings acknowledge that, although having experienced project teams is essential to address the challenges of complexity on projects, having experienced teams on complex projects comes with significant costs, which may reduce the financial success of the project, making overall success insignificant. The cost of project complexity influences

project success by reducing the ability of the project to be completed within the scheduled time, thus increasing the cost of human resources (expertise) used on the project above the figure initially specified and significantly reducing the overall project outcome (Bjorvatn & Wald, 2018). The findings of this study are corroborated by prior studies which found that project team's expertise and experience, and the inherent technicalities of projects, are associated with project outcomes (Bhattacharjee et al., 2013; Nguyen et al., 2019; Twumasi et al., 2013). The lack of knowledge, experience, and technicalities occasioned by complicated project scopes in Ghana's construction industry are major factors that cause project delays, leading to cost overruns (Twumasi et al., 2013). Invariably, project teams that have gained more experience working on complex projects are more likely to use the knowledge and expertise gleaned from solving earlier project complexities to solve similar complexities encountered on new projects. Consequently, project complexities are likely to have a less negative impact on project success when members of the project team are highly knowledgeable and experienced. Although experienced project teams can reduce the overall negative effect of project complexity on project success to a negligible level, this comes at a cost to projects. The cost of hiring experienced project teams to work on complex projects can also reduce the overall financial benefits to projects, leading to insignificant project success outcomes finance-wise.

The study findings also suggest that the interconnection between project factors such as time, cost, quality, and stakeholder involvement in projects makes achieving project success difficult. A project may be completed on time, but if it exceeds the originally agreed upon project cost as defined in the project scope, the overall success of the project may be diluted because of the additional cost incurred. Again, the study finding indicates that although a project may be completed on time, with quality and cost meeting stakeholders' expectations, defining the project as being a success will be a challenge if the perceived benefit to the sponsor no longer exists or is not as originally anticipated. When projects meet planning objectives, they may not necessarily meet the needs of end-users or more generally stakeholders (Belout & Gauvreau, 2004).

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Reconciliation of Research Questions

8.1.1 Research Question 1: What is the meaning and understanding of project complexity (faith, fact, and interaction) among project leaders and teams within the Ghanaian construction industry?

The qualitative findings regarding the conceptualisation of project complexity revealed that practitioners of project management in Ghana have a deep understanding of the concept of project complexity. This understanding cuts across both technical and non-technical issues surrounding the concept and the implications of project complexity on project outcomes in the Ghanaian construction industry. Issues regarding project scope, briefs, material quantities, and quality control were identified as the most common technical complexities experienced in the Ghanaian construction industry, while managing stakeholder interests, group communication, and cross-functional and multidisciplinary teams were elucidated as the non-technical complexities.

The expert participants revealed that even though the term complexity by faith is deemed appropriate in its meaning and classification, they did not feel comfortable that complexity by faith could be construed as the complexity associated with 'unknown' factors. The expert participants indicated that they would not step into the unknown or try novel ideas on projects unless at least one project team member had some knowledge on what was to be done, no matter how little it might be, to navigate the novelty. The difference in the applicability of complexity by faith between the conceptualisation of Geraldi and Adlbrecht (2007) and the experts was explained by the sense-making theory. The significance of sense-making in this context lay in the fact that it empowered the experts to act and to create meaning out of the ambiguities surrounding complexity of faith.

The expert participants agreed with the conceptualisation of complexity by fact, as advanced by Geraldi and Adlbrecht (2007). They confirmed that complexity by fact occurred in projects when project teams had to deal with large volumes of interdependent information. The complexity by fact aligned with aspects of the structuration theory, because for organisations to be able to disseminate and process information, the existence of well-structured communication systems were integral. Without such communication systems, complexity by fact became difficult to handle.

The expert participants also agreed with the conceptualisation of complexity by interaction, as advanced by Geraldi and Adlbrecht (2007). They indicated that complexity factors included complexities relating to the nature of projects (local or international), and the multidisciplinary and

diverse knowledge sets relating to projects and relationships that professionals bring on board. In view of the complex and knowledge-intensive nature of construction projects, such projects require considerable social capital for effective collaboration between all stakeholders. In this regard, social capital theory was found to provide a valuable framework and insight into explaining knowledge-sharing behaviour in project contexts (Bartsch et al., 2013; Di Vincenzo & Mascia, 2012).

8.1.2 Research Question 2: How does each project complexity dimension (faith, fact, and interaction) relate to project success?

8.1.2.1 Complexity by faith

The quantitative findings indicated that complexity by faith had no significant relationship with project success. Complexity of faith is typically found in projects that contain much novelty, and which may involve a design or process that is not familiar. However, during the course of large and complex construction projects, aspects of the project design and process might become familiar over time. Therefore, the newness of the project may be considered transient, and may dissipate during implementation. In this regard, the novelty of a project may not linger long enough to cause the project to fail. As project activities are executed, the direction of the project becomes certain (known), in which case the perceived influence of novelty (complexity by faith) on project success may be insignificant.

The qualitative findings also suggest that what a project team perceives as a novel project may be a reflection of the depth of knowledge and experience of the project team regarding project activities. Project teams with extensive project experience from past projects may understand and be more familiar with novel situations than project teams which are novice. Experience, therefore, can potentially bring clarity, indicate possibilities, minimise the presence of complexity of faith, and, consequently, diminish the role of complexity in predicting perceived project success. The demographic data of the study show that about 38 per cent of participants have worked within the construction sector for more than 10 years. It is therefore possible that, with their level of experience, most of them can deal with blurred and unclear situations, which are characteristics of complexity of faith.

Construction projects are multidisciplinary, which implies that they typically involve various experts whose rich experiences can be instrumental in minimising complexity by faith. With the rich experience of these experts on project teams, the experts would not have to rely on intuition in dealing with complex situations on projects. Hence, experienced project teams are likely to transfer

their skills and knowledge from earlier projects to solve unique problems on the job and may become used to solving such problems. This is perhaps why complexity by faith had no significant relationship with project success.

8.1.2.2 Complexity by fact

The quantitative results showed that complexity by fact had a significant, but small (-0.17) negative relationship with project success. This finding was consistent with a study by Nguyen et al. (2019), which found that project complexity was positively related to an increase and extension of project schedule, indicating that complexity by fact reduces project success. In addition, Ansah (2011) found that the major reason for the lack of completion of construction projects in Ghana was due to consistent changes in project scope. The small negative relationship signifies that the complexity by fact did not explain much of the variation in project success. The small coefficient implies that there may be other relevant predictors that combine with complexity by fact to explain project success. Based on this, the qualitative findings identified that the absence of proper data collection, analysis, and application of information that are associated with complexity of fact lead to poor project outcomes. The lack of information management skills and tools accounts for the various challenges associated with the effective use of project information for project planning and implementation. Complexity of fact is typically characterised by time constraints, which affect the collection and analysis of information (Geraldi & Adlbrecht, 2007; Zhu & Mostafavi, 2017). The collection and analysis of data represent work that must be done, which requires employing people and delegating tasks as well as using computer-aided instruments to collect and analyse data. The inability to properly manage and analyse large quantities of data creates problems for project teams. Also, the inability to properly manage and analyse information and make useful inferences leads to poor project outcomes. Even when corrected later, such wrong decisions create a huge negative impact during the project life cycle, leading to delays and failures.

8.1.2.3 Complexity by interaction

The quantitative results showed that complexity of interaction had a significant, but small (-0.16) negative relationship with project success. This finding is similar to the findings of studies by Antoniadis et al. (2011) and Luo et al. (2017), which found a negative relationship between socio-organo complexity (complexity of interaction) and project performance. The small negative relationship shows that the complexity by interaction did not account for many of the changes in project success. The small coefficient implies that there may be other relevant factors that combine

with complexity by interaction to explain project success. The qualitative findings largely corroborated the findings made in the quantitative analysis by identifying other potential factors that combined with complexity by interaction to influence project success. The qualitative findings suggested that the absence of proper management of internal and external organisational processes can have a negative influence on project outcomes. Construction projects are made up of a multiplicity of stakeholders with diverse interests that must be considered if projects are to be successful. Complexity of interaction is typically signalled by a high number of e-mails, phone calls, and meetings about misunderstandings, usually involving teams (internal stakeholders) and customers (external stakeholders). These situations can create a negative impression about the outcomes of the project, which could lead to the project having minimal impact. The negative relationship between complexity of interaction and project stakeholders may be because project stakeholders, such as customers, are not involved at the project's inception. This can influence the perception of project users who may not accept the project. Additionally, lack of access to project information can account for the negative relationship between complexity by interaction and project success, albeit insignificant.

The criticality of effective stakeholder management contributed to the negative effect of complexity by fact on project success. The qualitative findings revealed that stakeholders, owing to their level of importance to projects (i.e., interest, salience, and power), can cause projects to fail through their actions or inactions. There are only a few project managers and teams that have the requisite skills and experiences to effectively manage high-level stakeholders on complex projects in Ghana's construction industry, hence resulting in project failure. Having a large number of stakeholders can hinder the effective management of stakeholders, thus negatively influencing project outcomes. Therefore, the effective management of both internal and external project stakeholders has implications for the creation of positive synergy for project success.

The contextualised findings from both the quantitative and qualitative results accentuate the important influence of interactions and interdependencies on project execution and why the lack of effective management of such interdependencies can be costly for overall project outcomes. Particularly, key attention should be directed at ensuring that every stage of the project life cycle and independencies are simplified for all stakeholders involved at every level of the project. This is because the most negligible dissonance among stakeholders can create multiple levels of complexity for the project and hinder its successful completion.

8.1.3 Research Question 3: How is project complexity related to project success?

Studies on projects within the construction industry generally suggest a negative relationship between project complexity and project success. Wood and Gidado (2018), for instance, reported a negative relationship between project complexity and project success. Nguyen et al. (2019) found that uncertainty and risk, which are characteristics of project complexity, negatively affected project success. The results and findings of this study reflect the general direction of previous studies concerning the relationship between project complexity and project success within the construction industry, although the quantitative result was statistically insignificant. The findings showed that project complexity can reduce project success by affecting the quality, cost, and time of the project, leaving stakeholders and investors unsatisfied. Project complexity is also associated with risks, delays, and ambiguities, which can lead to constant changes in the scope and structure of the project. Changes made to the scope, structure, time, and especially cost, influence stakeholder perceptions of project success.

However, the qualitative findings indicated that experienced project teams on complex projects can minimise the negative effect of project complexity on project success – the reason being that having experienced project teams means having teams that are likely to have been exposed to various project-related challenges and are therefore well placed to tap into their previous experiences to solve challenges that emerge on complex projects. However, the overall financial benefits to be accrued to the project can be eroded as a result of the cost associated with hiring experienced project teams, but simultaneously improve other success measures such as time and quality. The combined evaluation of success can then become negligible or difficult to determine, which may account for the insignificant relationship between project complexity and project success found in this study. Lehtiranta et al. (2012) asserted that metrics related to cost are essential project success determinants. When construction firms realise that projects are complex, requiring specific technical expertise to address the project complexity, they invest in extra quality resources than would usually be required, to cater for any potential adverse outcome (Hanisch & Wald, 2014; Tatikonda & Rosenthal, 2000). Although investing in quality resources has the potential to enhance project success outcomes, the project success outcomes are also likely to be eroded by the cost of having more skilled people to handle the complex issues. With the injection of more resources, the project may be successful, but may increase the project cost and potentially reduce profit margins. This could account for the insignificant relationship between project complexity and project success in this study.

The findings from the qualitative study further suggest that project success can be ambiguous and the meaning of the success of complex projects can vary, depending on who is defining it. The reason is that the dimensions of project success are wide-ranging. Whereas one success dimension such as stakeholder satisfaction may be met, the cost of the project may exceed the originally agreed upon project cost making the project sponsor unhappy and therefore likely to define the success of the project differently. This finding aligns with the view that project success mean different things to different stakeholders (Cooke-Davies, 2002; Rezvani et al., 2016; Serra & Kunc, 2015). The interconnection between project factors such as time, cost, and quality, and stakeholders involvement on projects makes achieving project success difficult. When projects meet planning objectives, they may not necessarily meet the needs of end-users or more generally stakeholders (Belout & Gauvreau, 2004). The situation where different stakeholders emphasise different things as project success makes its definition difficult and ambiguous, especially for complex projects.

8.1.4 Research Question 4: What are the relationships between project leadership styles (transformational, transactional, and ethical) and project success?

The results of the quantitative study and findings from the qualitative phase confirmed that transformational leadership had a significant positive effect on project success. This study supports some previous studies that found a positive relationship between transformational leadership and project success (Iqbal et al., 2019; Maqbool et al., 2017; Naeem & Khanzada, 2017; Oh et al., 2019). Transformational leaders are able to induce more favourable project outcomes through their abilities and competencies (ability to lead by example, inspire, empower, and empathise with their followers) to influence project teams and stakeholders. In the Ghanaian construction industry, Famakin and Abusiga (2016) asserted that transformational leadership embodies high-quality relationships, which entail support, trust, respect, and encouragement between project managers, teams, and stakeholders. The qualitative study revealed that transformational leaders guide and engage with stakeholders to ensure that project objectives are met at every stage of the project. Transformational leaders provide a vision that results in creating a sense of pride and trust in project teams and stakeholders. Transformational leaders focus on their teams' personal development, thus building their capacity and confidence to develop innovative solutions. Transformational leaders also influence project teams to strive to achieve more and beyond their required tasks and responsibilities in achieving project objectives. These high-quality relationships encourage project teams to exhibit high energy levels and mental resilience while working and they are willing to invest more effort and persist in their work. For many project teams and stakeholders, the quality of relationship that they have with their leaders pushes them to fully concentrate and be happily engrossed in their work, to the extent

that they remain committed to both their manager and project goals and have the passion to perform tasks voluntarily and successfully. This ultimately leads to more satisfied project teams and project users or customers.

The findings and results confirmed that ethical leadership had a significant positive relationship with the success of complex projects. The qualitative study indicated that ethical leaders require strict professionalism and adherence to moral standards through their behaviours. As a result, ethical project leaders are able to inspire their project teams to perform highly and also establish healthy work relationships. Ethical project leaders foster team unity and mutual understanding, supporting the exchange of knowledge and ideas. Ethical leaders also demonstrate hard work and dedication, which become exemplary behaviours for project members to emulate. Ethical leaders are generally approachable, which fosters trust and cooperative relationships with their team. Ethical leadership tends to increase the satisfaction and loyalty of customers, and also to create harmony, trust, brotherhood, values, and moral standards among team members (Bhatti & Kiyani, 2019). When project managers exhibit exemplary ethical behaviours on projects, team members emulate these behaviours, which ensures project success (Raziq et al., 2018).

Additionally, ethical leaders are honest and trustworthy and are likely to deal with stakeholders fairly, thus leading to better stakeholder satisfaction and project success. In this light, Ng and Walker's (2008) study has stressed the need for project leadership behaviours that build the trust and confidence of project teams. Trustworthy and honest behaviours (ethical leadership), according to Ng and Walker (2008), positively influence customer and team impact.

Construction activities, like most economic activities in emerging economies, are highly capital intensive. Construction works drive important developmental and infrastructural activities, which makes government involvement a necessity. The issue of corruption as a result of the absence of accountability and transparency, which is endemic in most political settings, is also present in most construction projects. Political interference and absence of openness in government construction projects imply that elected officials are able to engage in corrupt practices in construction activities. The failure of most construction projects has largely been attributed to corruption and lax institutional and regulatory frameworks. With these issues of corruption, having the right kind of leader can act as a significant safeguard against corrupt practices in the construction industry. The ethical leader possesses integrity and high moral standards with a strong interest in demonstrating and insisting on high levels of professionalism. Ethical leaders act as the moral compass for the project and through their actions guide and ensure that project teams fulfil their roles with utmost professionalism and

concern for ethics. As a result of the presence of ethical leaders, corrupt practices are easily eschewed, which minimises the rate of project failure.

The findings of the quantitative study showed that transactional leadership had no significant influence on project success for complex projects. Transactional leadership is an exchange process that is based on the fulfilment of contractual obligations, which involves setting objectives and monitoring and controlling outcomes. The primary preoccupation of the transactional leader is the fulfilment of project goals without much regard for satisfying intrinsic needs such support, concern, and personal growth and development. Therefore, a transactional project leader will make goals and requirements clear to all individuals without much focus on establishing relationships or engendering trust from the project team. In addition, the transactional leader does not involve stakeholder and project teams in important decisions, which stifles buy-in or mutual understanding and collaboration, especially when projects are complex (Raziq et al., 2018). Similarly, the qualitative findings showed that transactional leadership does not encourage commitment and extra effort from project teams. The inability of transactional leaders to elicit commitment and extra effort is due to the use of short-term financial rewards rather than intrinsic rewards.

8.1.5 Research Question 5: To what extent do leadership styles (transformational, transactional, and ethical) play moderating roles in the project complexity–project success relationship?

In measuring the moderating effect of leadership styles on the relationship between project complexity and project success, the quantitative findings confirmed that transformational and ethical leadership styles positively moderated the negative effect project complexity has on project success. The qualitative findings provide some explanations for these results. Transformational and ethical leaders can stimulate their project team to go beyond required expectations to complete tasks. This trait is essential because of the nature of complex projects and how interdependencies between various tasks and stakeholders create challenges that hinder the successful completion of projects. Moreover, because these two categories of leaders provide support and guidance (morally in the case of ethical leaders) when projects encounter complexity, they inspire project teams to strive for success more often than transactional leaders. Therefore, the positive influences of transformational and ethical leaders moderate the negative relationship between project complexity and project success.

Additionally, the exemplary conduct of transformational and ethical leaders makes them positive role models that reinforce professional behaviours among their project teams. This is especially evident in difficult times during project execution when there is the temptation to cut corners to meet key

deadlines and schedules. As a result of such positive and exemplary traits, project teams trust such leaders to provide direction and inspiration to help the team navigate difficulties. Moreover, because transformational and ethical leaders lead with empathy, they are able to engage their project teams and provide them with the needed support to help them perform at their best.

Transactional leadership style, in contrast, failed to moderate the relationship between project complexity and project success. The qualitative results indicate that transactional leaders in the construction industry are usually reactive in their approach to project management. As a result, transactional leaders are unable to anticipate impending complexities and create contingencies to deal with them but rather only provide reactive solutions, which are usually rushed and implemented far too late to have any positive effect on complexities.

While the findings confirm that leadership can serve as an effective remedy for the negative effects that project complexity has on project success, the findings also suggest that transactional leadership style has the least effect when projects experience complexity, and thus does not contribute to success of complex projects. Project managers therefore need to focus on exhibiting transformational and ethical leadership styles when dealing with complex projects as they have been found to provide the most effective remedy during challenging periods in the execution of such projects.

8.1.6 Research Question 6: To what extent do project leadership roles play moderating roles in the project complexity–project success relationship?

The quantitative findings confirmed the significant moderating effect of most project leadership roles on the relationship between project complexity and project success. Project leadership roles thus positively moderate project success. It was found that project leadership roles and behaviours that are about providing visionary guidance and support have a better moderating effect than those that are task-oriented. For instance, roles like direction-setter, ethical tone-setter, catalyst of possibilities, goal orchestrator, compassionate anchor and integrator showed positive moderating effects, while the energiser and mobiliser role did not significantly moderate the relationship between project complexity and project success. Project leadership roles induce positive attitudes among project team members, which increases their psychological resources to deal with project challenges. Each role makes a unique contribution towards influencing the attitudes of project team members. Project roles clarify project goals, provide vision, encourage innovation, and inspire and motivate employees. Project roles positively influence employees' behaviours, which translate into positive project

outcomes in challenging project conditions. Collectively, these roles combine to influence project outcomes.

The qualitative findings correspond with the quantitative results and offer some explanations. Firstly, project leadership roles effectively moderate the project complexity–project success relationship to foster good working relationships between project teams and empower the same in the face of complexities, while inspiring them to meet set project outcomes. For instance, roles like direction-setter, compassionate anchor, goal orchestrator and catalyst of possibilities were found to moderate the relationship between project complexity and project success. Hence, project managers who exhibit these leadership roles empower their project team members to exert more effort that is beyond their usual capabilities to complete tasks.

In contrast, the energiser and mobiliser role failed to moderate the project complexity–project success relationship because, in the Ghanaian context, project teams like to see their leaders act rather than speak. Hence, project managers that merely show optimism and enthusiasm without following up with actions do not elicit the desired reaction from their project team members. Consequently, showing optimism and enthusiasm without the requisite knowledge and specific actions will play no role in minimising the negative effect of project complexity on project success. In an uncertain and volatile project situation, optimistic tendencies may be less influential in dealing with the negative effects of project complexity. Optimism may not be helpful at times and can be counterproductive. For example, telling project team members that they can do the job when they actually do not have the capability does not alter the outcome of the project. Rather, it causes project teams to spend time and exert effort on a fruitless task. The role of the energiser and mobiliser in complex projects may only be a preoccupation with answers that do not solve the problem of complexity. Simply put, optimists push possible adverse outcomes under the rug to create an illusion of control in their minds. When project managers demonstrate behaviours that merely demonstrate optimism, they may overestimate the future opportunities of a project and spend much more than makes sense for the allocated budget to spend. According to Robinson (2013), project complexity is the result of attentional input, memory, and other information-processing demands imposed by the project's structure. Project complexity therefore places demands on a project manager and requires the use of complex reasoning, which demands utmost attention. The performance of the role of energiser and mobiliser can serve to encourage team members to have a positive outlook. Having a positive outlook about complex project situations can help project teams to cope with negative project situations. However, when project managers demonstrate behaviours that tend to focus on merely maintaining a positive outlook, they may somehow be blind to the risks and uncertainty. The absence of

preparedness and awareness of the uncertainty within the project may create other problems. As such, demonstrating unrealistic levels of optimistic behaviour, which is characteristic of the energiser and mobiliser role, might lead project team members to believe – and overestimate – potential opportunities as a surety, while minimising the potential influences of project risks and uncertainty.

The combined quantitative and qualitative findings provide a context to explain why some leadership roles moderated the relationship between project complexity and project success, while others did not. It is clear from the findings that, while all project leadership roles are relevant for project environments, complex projects require project managers to go beyond these traits to back such behaviours with knowledge and expertise. Project managers that play these project leadership roles but lack knowledge of the technical aspects of projects are less likely to provide the resources needed to help their project team throughout the project life cycle. Project leadership roles such as direction-setter, compassionate anchor, goal orchestrator and catalyst of possibilities were found to have a significant influence on project complexity and project success in the Ghanaian construction industry, and thus project teams will be better equipped when their project managers play such roles.

8.1.7 Research Question 7: What are the underlying factors, if any, that influence the relationships between project complexity, project success, and project leadership?

Individual and organisational competencies influence the relationship between project complexity and success on complex projects. In essence, the experience levels of individuals on project teams are critical in dealing with project complexity because experienced project teams are likely to transfer their skills and knowledge from previous projects to solve difficult problems. In situations where knowledge is unavailable, expert advice is sought, or experts are co-opted to join the project team. In the Ghanaian construction industry, project teams for complex projects are usually experienced in their field and have worked on other complex projects. Thus, such individuals are likely to have expertise and knowledge of the key aspects of the project scope; hence, they are highly likely to find solutions to project complexities.

For most project managers, complexity of fact is a project situation that comes with adverse consequences. However, the study found that participants believed that project complexity can largely be managed, and, when properly managed, it can lead to more positive project outcomes. The adverse effect that project complexity has on project success is minimised through management interventions. For example, some aspect of complexity by fact, like that associated with inadequate time to process large volumes of digital information, can be mitigated through information

management. The ability to analyse, manage, and apply project information timeously can be enhanced by employing data management experts. In addition, information processing tools and equipment can be an indispensable investment that can mitigate the effects of complexity by fact. Therefore, investing in an information management system is best to deal with such complexities.

The relationship between project complexity and project success is based on defined project success and stakeholder perspectives. These findings suggest that the influence of project complexity (interaction) is dependent on stakeholders' perceptions. Effective management of both internal and external project stakeholders creates positive synergy for project success. However, having a huge number of stakeholders can hinder their effective management, thus negatively influencing project outcomes. The findings of this study show that the dissonance between project teams and stakeholders is one of the most important factors responsible for project delays.

Beyond dealing with varied stakeholders, managing internal and external interdependencies is a major reason for the negative impact that project complexity has on project success. For instance, the different frames used by project team members to interpret information due to their different professional and academic training. In addition, the nonalignment of policy decisions and incongruent institutional process common with external stakeholders, like government bodies and regulatory institutions, create challenges for project managers and their teams throughout the project life cycle and usually leads to project failure.

Transformational and ethical leadership styles influence the attitudes of project teams and stakeholders. Transformational and ethical leadership promotes high-quality relationships characterised by trust, support, and respect, and creates a conducive project environment for effective stakeholder engagement. In addition, transformational and ethical leadership traits exhibited on complex projects are seen to engender customer and team impact, as well as prepare for the future based on the direction, empathy, and empowerment project managers offer to the project teams and stakeholders associated with complex projects they manage. Specifically, transformational leaders' ability to communicate the precise vision and provide directions to attain this vision creates a guiding coalition and removes ambiguities from project teams in relation to meeting important tasks and deadlines. Their ability to reach out to and consult members of their project teams and other external stakeholders during difficult periods in the project life cycle helps them to gain buy-in and engender commitment among all stakeholders. The ability of transformational leaders to create room for the personal development of their project team was highlighted to be one of the reasons why the transformational leadership style positively enhances

project outcomes. This is because individuals are given the space to experiment and innovate within the boundaries of a project's standards without fear of punishment from their project managers. Thus, they can develop themselves on the job, while meeting project deliverables and milestones.

The study found that ethical leaders are the moral compass in construction projects. Ethical leaders demonstrate exemplary behaviours and strictly adhere to the ethical principles of accountability, professionalism, transparency, and fairness. As role models, ethical leaders establish mechanisms for the development of responsible project teams and stakeholders. Project teams and stakeholders are also more willing to work with project managers who demonstrate ethical leadership. Ethical leadership also demonstrates behaviours that prevent the proliferation of corrupt practices in construction projects.

8.2 Contribution to Research

The purpose of this study was to examine the relationship between project complexity and its dimensions (faith, fact, and interaction) and project success in the context of the construction industry of developing economies. Similarly, the aim of the study was to understand the moderating role of project managers' leadership styles and roles and how they influence the project complexity–project success nexus on complex projects. The nature, context, methodology, approach, and results of this study provide useful contributions to the project management and project leadership literature, not only in Ghana, but also in other developing economies. The pragmatism philosophy and mixed-methods approach adopted allowed for a more nuanced understanding of project complexity and project success and their relation to each other. Earlier studies on project complexity and project success adopted either a quantitative or qualitative approach. However, the adoption of either the quantitative or qualitative approach does not provide the opportunity for a comprehensive understanding and application of the concepts of project complexity and success. By using both quantitative and qualitative methods, involving experts, practitioners, and scholars in the construction industry of an emerging economy, this study provides a more in-depth understanding of the dynamics of project complexity, leadership, and project success.

With regard to its nature and context, this study properly situates the concept of complexity in the emerging economy. The findings of the study provide insight into how the concept of complexity can be understood and contextualised among practitioners in the construction industry of emerging economies. The study also goes beyond earlier studies in Africa, which looked at project complexity purely from a Western perspective or from the perspective of developed economies, thus providing a more contextualised explanation of project complexity and project success. The results however

demonstrate that the understanding of complexity in emerging economies is largely similar to Western perspectives. In this regard, the measures for project complexity in developed countries can be applied to emerging economies. Previous studies have suggested that project complexity is negatively related to project success (Ishtiaq & Jahanzaib, 2017; Luo et al., 2017; Parsons-Hann & Liu, 2005; Tatikonda & Rosenthal, 2000). The present study expands the findings of these earlier studies by examining how different situations characterising complexity almost automatically engage mitigating measures to not influence project success negatively. The findings make a significant contribution to the literature on the role of information management in the project setting from the perspective of a developing country. Concerning complexity by interaction, the study also suggests that, beyond the number of project stakeholders, the interactions and interdependencies among stakeholders play an important role in achieving project success. The dissonance between project teams' and stakeholders' desires can influence project outcomes.

Previous studies suggest that project complexity inversely influences project success (Ishtiaq & Jahanzaib, 2017; Luo et al., 2017; Parsons-Hann & Liu, 2005; Tatikonda & Rosenthal, 2000). However, the influence of the project manager's leadership approach in these relationships has not received much attention. The findings of this study suggest that ethical and transformational leadership and project leadership roles in general positively improve the relationship between project complexity and project success. In previous studies, project leadership roles have been developed theoretically by some scholars without empirical investigation. This study has built on the work of previous authors by developing a project leadership role instrument with seven dimensions that had only been theoretically examined by De Klerk (2014), De Vries (2007) and Senaratne and Samaraweera (2015). The project leadership role scale was developed as a new instrument, which can be used to examine the influence of project leadership roles as moderators in the relationship between project complexity and project success. This study has contributed to knowledge on project leadership by revealing that project leadership roles (composite) improve the project complexity–project success relationship. The conceptualisation and development of the project leadership roles scale deviates from the norm and preoccupation with leadership styles that have been extensively used in the project management setting. More importantly, the findings of the study show that there are certain duties and obligations that project managers can fulfil to ensure project success, which are more practical than a preoccupation with leadership styles.

8.3 Contribution to Practice

The findings of the study highlight some adverse effects that project complexity potentially has on project success. Each dimension of project complexity is related to different project situations that

must adequately be dealt with in order to achieve expected results. For the complexity associated with novelty and uncertainty, experience plays a significant role in ensuring project success. Complexity of fact relates to proper decision-making that is guided by reliable information and skilled personnel. Complexity of interaction requires proper stakeholder engagement and communication. Practically, solutions in dealing with project complexity are not uniform. Rather solutions must be tailored for unique project situations that constitute complexity. The findings of this study also make useful contributions to the relevance of technology and knowledge in dealing with complexity of fact in emerging economies.

The findings of the study underscore the need for project managers to employ the transformational leadership approach. Project team members often require a compelling reason to be fully engaged and involved in project activities. Therefore, the project manager, as the figurehead, has to provide that compelling reason to project teams by creating and communicating a clear vision of the project. The vision of the leader provides a sense of purpose for the project teams and stakeholders. The vision becomes the reason why they would aspire to achieve project goals. The vision is created by demonstrating a clear understanding of the values and principles of the project team, while also considering the capabilities, skills, and abilities of project teams and stakeholders. Creating an enduring vision for the project also involves scanning the environment for threats and opportunities and making more informed choices. In the transformational process, appealing to the values of project teams and stakeholders and inspiring them with a clear direction can create positive project outcomes. Project managers must understand that nothing meaningful occurs without the motivation of project teams. Hence, they must employ more suitable forms of motivation to create more positive project outcomes through project teams and stakeholders. A compelling vision creates enthusiasm in project teams and stakeholders, which endures in times of uncertainty and other challenges associated with the novelty of a project as it instils some faith in them that the project will be successful.

In delivering the vision of the project and project goals, it is important for project managers to be practical. A vision serves no purpose on its own and requires effort to become a reality. Most project managers have the tendency to create a vision, which is not supported by visible efforts towards achieving project goals. To adequately deliver the vision of the project, a leader's action must reflect intent through exemplary behaviours of hard work and diligence in order to garner support from project teams. Additionally, leadership is a long-term process that requires consistent effort to build relationships and earn trust. Relationships and trust are key social resources that can keep project teams and stakeholders together when a project encounters difficulties. Trust can be built when

project managers initiate and establish communication that is open and honest. This is integral to the delivery of successful outcomes, especially when projects are complex.

Practically, the findings of this study suggest that project teams and members require more from their managers. Leadership that is based on rhetoric and words alone cannot elicit the desired reaction from project teams and stakeholders. When the progress of projects stagnates because of complexities, it takes the technical know-how and actions stemming from the technical knowledge of the manager to drive the project team on. This has implications on the competence and abilities required, especially during the training and development of leaders. Practically, leadership training must increase and improve leaders' technical abilities and knowledge to make them better equipped to handle complex situations.

One way to operationalise ethical behaviour is to have leadership put in place structural mechanisms for managing ethics. These mechanisms would include monitoring ethical behaviour among project team members, communicating ethical polices, creating channels for reporting ethical violations, creating ethical training, and establishing an internal audit committee. Considering the fact that corruption is widespread in construction projects, the management of ethics must be designed to fight corruption in such projects. Project managers need to establish clear and well-enforced corporate guidelines and policies against corruption, rather than relying on the personal morality of employees. It is therefore recommended that project leaders develop codes of ethics as a way of reinforcing an organisation's ethical philosophy. For such a code of ethics to be meaningful, it must be based on the potential ethical dilemmas which may be faced by project teams. It must be communicated to project members, and it must be enforced. Communication between the project management team and project team members can be challenging, especially owing to the sheer size and complexity of construction projects. However, the management of ethics is a significant part of construction project management and requires a well-planned programme for its development and implementation.

Training represents another important area to consider for guarding against potential unethical and corrupt behaviours. The most effective way of dealing with corruption is for leaders to be proactive and to put in place systems that prevent corruption, rather than reactive means of rooting it out. To achieve this, ethical values and awareness must be inculcated and institutionalised at all levels of the project environment. Ethical training which is based on a code of ethics that is rooted in specific role-based situations and dilemmas can facilitate awareness of ethical issues and thereby potentially forestall unethical behaviour.

The presence of corrupt practices within the construction industry in most emerging economies is a source of concern. Corrupt practices are considered to be a product of the lax institutional and regulatory framework centred on the political interference and involvement of government in most construction activities. In these circumstances, having the right leader with the right attitude and behaviour can provide safeguards against corruption. Leadership that embraces ethics and demonstrates behaviours characterised by professionalism, integrity, accountability, and transparency provides the right conditions to mitigate corruption and its adverse effects. Construction projects require a leader who does not employ rhetoric only, but through demonstrable actions sets the right example for project teams to follow. Having an ethical leader can go a long way to ensure the success of construction projects.

It is further recommended that the criteria for the selection of project teams be strengthened as part of the tender evaluation processes leading to the award of complex projects. The practice of only evaluating the experience and expertise of the consulting firm and lead contractor should be phased out and replaced with a more holistic regime that evaluates the expertise and experience of all senior level and technical staff who will work on complex projects. This will ensure that they possess the required technical skills and the necessary experience to identify issues and act proactively to deal with project complexity.

8.4 Limitations and Recommendations for Future Research

This study is not without limitations. First, the study focuses on construction projects specifically within the Ghanaian construction industry. The subject of project complexity and success in the construction industry is important in emerging economies. However, focusing specifically on construction projects in Ghana alone may not provide the complete picture of the situation in other emerging economies. However, this study can serve as a guide for replication in other jurisdictions. The construction sector is made up of formal and informal subsectors with unique characteristics, relating to size and clientele. This study mainly focused on large project sizes and budgets. Therefore, its findings may not apply to small and medium-sized projects in Ghana's, or other emerging economies' construction industry. As a result, future researchers may want to focus on small to medium-sized projects in their studies. Moreover, the study's focus on high-budget construction projects is a limitation that needs to be addressed by future studies. It will be important for future research to include low- to medium-scale funded projects. Statistical models were developed to investigate statistically the moderating effect of leadership styles and roles in the project complexity–project success relationship. It is acknowledged that, in view of the dynamic nature of project

environments, it is often not easy to statistically capture the implications of these varying environments in a model.

The study provides some theoretical underpinnings (sense-making theory, structuration theory, and social capital theory) in the conceptualisation of project complexity in the Ghana construction industry. These theories have been underutilised in examining the relationship between project complexity and project success. Future studies could empirically test these theories more directly in relation to the project complexity dimensions and shed more light on how such theoretical positions affect project management processes. The findings of the study suggest that complexity by faith had no influence on project success owing to the potential role of project experience. Hence, future studies can empirically examine the role project experience plays in the relationship between novelty, uncertainty, and project success. Another explanation for the inability of complexity of faith to influence project success is that respondents considered success after implementation of mitigating measures to deal with complexity. Therefore, the results of the study reflected the confounding influence of mitigating measures. It is important therefore for future studies to focus on collecting data across different time periods preferably before and after mitigating interventions for complexity are introduced.

Likewise, the issue of how data are handled provided insight into why complexity by fact had a negative influence on project success. In most emerging economies, the use of information technology to gather and analyse data to inform decision-making in the project environment has not gained much ground compared to developed countries. As such, the influence of information technology in the management of data on complex projects has not been explored much, particularly in the construction industry of emerging economies. The study has provided findings which emphasise the importance of information management. Future studies can explore the role of information technology in the relationship between complexity by fact and project success. The study also indicates that the absence of proper stakeholder management creates issues that affect project success. Construction activities are important for the economic and social development of emerging economies and invariably draw a lot of stakeholder interests. In practice, every stakeholder interest cannot be satisfied, and so identifying which stakeholder to focus on becomes important in ensuring project success. Therefore, studies could be conducted to identify potential stakeholders that can facilitate or inhibit the success of construction projects.

The findings of the study suggest that leadership styles such as ethical and transformational leadership styles are associated with favourable project outcomes. Generally, ethical and transformational

leadership styles demonstrate behaviours that positively affect project teams and stakeholder perceptions. These behaviours include trust, respect, communication, and empathy. However, the extent to which these behaviours are demonstrated by ethical and transformational leadership styles may vary. Future studies can specifically explore trust, respect, and empathy and examine whether they lead to project success. Furthermore, future studies can examine how the demonstration of trust, empathy, respect, and communication differs for the transformational and ethical leadership styles. The literature study could have been further enriched by exploring some of the latest positive approaches to leadership, for example authentic, engaging, empowering and positive leadership as constructs, as well as their potential influence on project management. Future studies can examine the effect of authentic, engaging, empowering and positive leadership as moderators in the relationship between project complexity and project success.

This study did not discuss the work of Margerison and McCann on types of work and how they compare with project leadership roles. The findings of the study suggest that project leadership roles moderate the relationship between project complexity and project success. Future studies could examine Margerison and McCann's model, which assumes that people are motivated to perform the type of work they prefer and how this view moderates the relationship between project complexity and project success.

This study successfully conceptualised project leadership roles and created an instrument to measure project leadership roles, which were used as a moderator. Through the scale development, the concept of project leadership roles was operationalised as a construct with seven sub-dimensions. Out of the seven dimensions of project leadership roles, the energiser and mobiliser dimensions failed to moderate the relationship between project complexity and project success. There is a need for further studies to re-examine this relationship and use the scale in other studies to confirm the scale's reliability.

8.5 Conclusion

The study set out to understand the relationship between project complexity and project success and to investigate how this relationship is moderated by project leadership styles (transformational, transactional, and ethical) and project leadership roles (i.e., direction setter, ethical tone-setter, energiser and mobiliser, catalyst of possibilities, compassionate anchor, orchestrating driver and integrator). While this study provided empirical support for previous studies, particularly on the negative relationship between project complexity and project success, the relationship between

project complexity and project success in the Ghanaian construction industry was not significant. This appears to suggest that the ambiguous nature of complex projects and the definition of project success of large construction projects in emerging economy settings could, in some cases, make it difficult to define success.

The statistically insignificant relationship between project complexity and project success in this study could be explained, based on the interviews with the participants. The participants indicated that the experience of project teams is critical in reducing the negative effects of project complexity on project success. Although experienced project teams can reduce the overall negative effect of project complexity on project success to a negligible level, this comes at a cost to projects. The cost of hiring experienced project teams to work on complex projects can also reduce the overall financial benefits to projects.

However, when project complexity was decoupled into its dimensions (complexity by faith, complexity by fact, and complexity by interaction), not all the dimensions had a negative relationship with project success. Project complexity by faith had no significant relationship with project success owing to the transient nature of uncertainty and novelty. Project know-how and experience were found to play a pivotal role in the relationship between complexity by faith and project success because the experience of project teams can minimise the ambiguity associated with uncertainty and provide directions that can improve project outcomes.

Both complexity by interaction and complexity of fact had significant, but small, adverse influence on project success. The qualitative findings sought to ascertain the possible explanation for the small effect. The qualitative study found that the inability of project teams to properly collect and analyse project information and the lack of proper stakeholder engagement were the reason for the negative relationship between project complexity and project success. These findings are important because they show that project complexity is broad and encompasses various project situations that are distinct. In addition, they imply that, in dealing with project complexity, specific solutions that are sensitive to unique complexity situations are likely to be more effective than generic solutions.

Also, the study examined the relationship between project leadership styles and project success. The results showed that transformational leadership and ethical leadership had a positive influence on project success. However, transactional leadership had a negative relationship with project success. Generally, these findings suggest that project managers' leadership approach in the Ghanaian setting

play an important role in determining project outcomes as it influences project teams either positively or negatively.

Transformational leaders demonstrate behaviours and actions that enhance relationships in the context. Transformational leadership encourages project teams to think outside the box and be innovative. In contrast, transactional leaders are goal-oriented and do not focus much on establishing relationships with stakeholders and project teams, which is not ideal for long-term complex projects. Ethical leadership leaves a lasting impact on project teams and stakeholders based on the project manager's actions that lead to trust, loyalty, respect, and professionalism. Ethical leadership stands out because it minimises the tendency for project teams to resort to cutting corners and engaging in unethical behaviours when they are under enormous pressure. Ethical leadership plays a role in curbing corrupt practices in construction projects through the adherence of the leader to principles of professionalism, fairness, accountability, and transparency. Of these three leadership styles, the transactional leadership style produces the least favourable project outcomes. These findings suggest that project managers must use more transformational and ethical leadership styles in the project environment, especially when faced with project complexity.

The study also investigated project leadership roles as a potential moderator of the relationship between project complexity and project success. All project leadership roles (composite) positively moderate the relationship between project complexity and project success. Through developing the project leadership role instrument and considering the moderating effect of project roles on project success, the study has made a meaningful contribution towards providing an alternative medium for project managers to influence project outcomes. Particularly, the study's focus on project leadership roles contributes to the management of project leadership. Project management generally deals with activities such as planning, controlling, and organising, which is in contrast with project leadership, which focuses on motivating, developing project teams, and providing a vision. The relationship between project leadership roles and leadership styles is often blurred, and generally there is a consensus among scholars on the complementary association between project leadership roles and leadership styles. In the context of construction projects, the balance between role fulfilment and leadership styles is more favourable for roles. The reason is that, in managing through leadership styles, vision plays a vital role. However, in the project setting, the objectives of the project are usually well-defined, implying that the project manager is more focused on performing roles than creating a vision. It therefore implies that aside from leadership styles, project leadership roles are also suitable for project environments.

In conclusion, project complexity is present in large construction projects in the form of problems associated with novelty, uncertainty, stakeholder engagement, and information management. The effect of project complexity on success depends largely on the type of complexity at play. By extension, efforts at mitigating complexity must be suitable for the type of complexity prevalent in the project environment. Additionally, leadership styles and fulfilling a set of project leadership roles by virtue of their influence on project success equally play a significant role in mitigating the adverse effects of project complexity.

REFERENCE LIST

Aaltonen, K., & Kujala, J. (2016). Towards an improved understanding of project stakeholder landscapes. *International Journal of Project Management*, *34*(8), 1537–1552.

Abbas, H. F., & Erzaij, K. R. (2020). Study of the complexity factors associated with the theory of complexity in Iraqi construction projects. *Periodicals of Engineering and Natural Sciences*, *7*(4), 2034–2044.

Adobor, H. (2005). Trust as sensemaking: the microdynamics of trust in interfirm alliances. *Journal of Business Research*, *58*(3), 330–337.

Afzal, A., Khan, M. M., & Mujtaba, B. G. (2018). The impact of project managers' competencies, emotional intelligence and transformational leadership on project success in the information technology sector. *Маркетинг і Менеджмент Інновацій*, *2*, 142–154.

Aga, Deribe A, Noorderhaven, N., & Vallejo, B. (2016). Transformational leadership and project success: The mediating role of team-building. *International Journal of Project Management*, *34*(5), 806–818.

Aga, Deribe Assefa. (2016a). Transactional leadership and project success: the moderating role of goal clarity. *Procedia Computer Science*, *100*(1), 517–525.

Aga, Deribe Assefa. (2016b). Transactional Leadership and Project Success: The Moderating Role of Goal Clarity. *Procedia Computer Science*, *100*, 517–525. https://doi.org/10.1016/j.procs.2016.09.190

Aga, Deribe Assefa, Noorderhaven, N., & Vallejo, B. (2016). Transformational leadership and project success: The mediating role of team-building. *International Journal of Project Management*, *34*(5), 806–818.

Agbenyega, I. (2014). *Quality management practices of building construction firms in Ghana*. Department of Building Technology, Kwame Nkrumah University of Science & Technology, Ghana.

Agyemang, F. G., Boateng, H., & Dzandu, M. D. (2017). Examining intellectual stimulation, idealised influence and individualised consideration as an antecedent to knowledge sharing: Evidence

from Ghana. *Knowledge Management & E-Learning: An International Journal*, *9*(4), 484–498.

Ahmad, M. G., & Loch, C. (2019). What do the followers want? The core functions of leadership. *The Leadership Quarterly*.

Ahmadi, A., & Golabchi, M. (2013). Complexity theory in construction project time management. *International Research Journal of Applied and Basic Sciences*, *6*(5), 538–542.

Ahmed, R., & Anantatmula, V. S. (2017). Empirical study of project managers leadership competence and project performance. *Engineering Management Journal*, *29*(3), 189–205.

Ahmed, R., & Azmi bin Mohamad, N. (2016). Exploring the relationship between multi-dimensional top management support and project success: an international study. *Engineering Management Journal*, *28*(1), 54–67.

Ahmed, R., Azmi bin Mohamad, N., & Tahir, M. (2013). The essence of project leadership is significant to project management. *Research Journal of Recent Sciences*, *2*(5), 44–48.

Ahmed, S., & Abdullahi, A. M. (2017). Leadership and project success in development sector. *Journal of Economics & Management*, *30*, 5–19.

Ahonen, J. J., Savolainen, P., Merikoski, H., & Nevalainen, J. (2015). Reported project management effort, project size, and contract type. *Journal of Systems and Software*, *109*, 205–213.

Al-Khaled, D. (2016). The Impact of Strategic Leadership on the Operational Strategy and Leadership Development. *The Impact of Strategic Leadership on the Operational Strategy and Leadership Development (March 9, 2016)*.

Al-sharafi, H., & Rajiani, I. (2013). Promoting organizational citizenship behavior among employees-the role of leadership practices. *International Journal of Business and Management*, *8*(6), 47.

Alavifar, A. H., & Motamedi, S. (2014). Identification, evaluation and classification of time delay risks of construction project in Iran. *International Conference on Industrial Engineering and Operations Management. Bali, Indonesia*, 7–9.

Alderman, N., Ivory, C., McLoughlin, I., & Vaughan, R. (2005). Sense-making as a process within complex service-led projects. *International Journal of Project Management*, *23*(5), 380–385.

Ali, M., Li, Z., Durrani, D. K., Shah, A. M., & Khuram, W. (2021). Goal clarity as a link between humble leadership and project success: the interactive effects of organizational culture. *Baltic Journal of Management*.

Ali, M., Zhang, L., Shah, S. J., Khan, S., & Shah, A. M. (2020). Impact of humble leadership on project success: the mediating role of psychological empowerment and innovative work behavior. *Leadership & Organization Development Journal*.

Alias, Z., Zawawi, E. M. A., Yusof, K., & Aris, N. M. (2014). Determining critical success factors of project management practice: A conceptual framework. *Procedia-Social and Behavioral Sciences*, *153*, 61–69.

Allen, E., & Iano, J. (2019). *Fundamentals of building construction: materials and methods*. John Wiley & Sons.

Alotaibi, A. B. (2019). *Project management: the implication of project management practices on project success in Saudi Arabia* (Doctoral dissertation, University of Portsmouth).

Amoako-Gyampah, K., Meredith, J., & Loyd, K. W. (2018). Using a social capital lens to identify the mechanisms of top management commitment: a case study of a technology project. *Project Management Journal*, *49*(1), 79–95.

Amoatey, C. T., Ameyaw, Y. A., Adaku, E., & Famiyeh, S. (2015). Analysing delay causes and effects in Ghanaian state housing construction projects. *International Journal of Managing Projects in Business*, *8*(1), 198–214.

Amoatey, C. T., & Ankrah, A. N. O. (2017). Exploring critical road project delay factors in Ghana. *Journal of Facilities Management*.

Amponsah, R. (2012). The real project failure factors and the effect of culture on project management in Ghana.

Amponsah, R. (2010). *Improving project management practice in Ghana with focus on agriculture, banking and construction sectors of the Ghanaian economy*.

Anaman, K. A., & Osei-Amponsah, C. (2007). Analysis of the causality links between the growth of the construction industry and the growth of the macro-economy in Ghana. *Construction Management and Economics*, *25*(9), 951–961. https://doi.org/10.1080/01446190701411208

Anantatmula, V. S. (2010). Project manager leadership role in improving project performance. *Engineering Management Journal*, *22*(1), 13–22.

Ansah, S. K. (2011). Causes and effects of delayed payments by clients on construction projects in Ghana. *Journal of Construction Project Management and Innovation*, *1*(1), 27–45.

Antoniadis, D. N., Edum-Fotwe, F. T., & Thorpe, A. (2011). Socio-organo complexity and project performance. *International Journal of Project Management*, *29*(7), 808–816.

Areiqat, A. Y., Alali, A., & Arikat, Y. (2018). Risk management to avoid project failure: a comparison study of construction projects in the GCC. *International Journal of Business Continuity and Risk Management*, *8*(2), 87-105.

Asamoah, R. O., & Decardi-Nelson, I. (2014). Promoting trust and confidence in the construction industry in Ghana through the development and enforcement of ethics. *Information and Knowledge*, *3*(4), 63–68.

Atkinson, R., Crawford, L., & Ward, S. (2006). Fundamental uncertainties in projects and the scope of project management. *International Journal of Project Management*, *24*(8), 687–698.

Avolio, B. J., & Bass, B. M. (2001). *Developing potential across a full range of Leadership Tm: Cases on transactional and transformational leadership*. Psychology Press.

Baccarini, D. (1996). The concept of project complexity—a review. *International Journal of Project Management*, *14*(4), 201–204.

Bacha, E. (2014). The relationship between transformational leadership, task performance and job characteristics. *Journal of Management Development*.

Bakhshi, J., Ireland, V., & Gorod, A. (2016). Clarifying the project complexity construct: Past, present and future. *International Journal of Project Management*, *34*(7), 1199–1213.

Barber, C. S., & Tietje, B. C. (2004). Competency requirements for managerial development in manufacturing, assembly, and/or material processing functions. *Journal of Management Development*.

Bartsch, V., Ebers, M., & Maurer, I. (2013). Learning in project-based organizations: The role of project teams' social capital for overcoming barriers to learning. *International Journal of Project*

Management, *31*(2), 239–251.

Bass, B. M. (1990). From transactional to transformational leadership: Learning to share the vision. *Organizational Dynamics*, *18*(3), 19–31.

Bass, B. M. (2007). Executive and Strategic Leadership. *International Journal of Business*, *12*(1).

Bass, B. M., & Avolio, B. J. (1994). Transformational leadership and organizational culture. *The International Journal of Public Administration*, *17*(3–4), 541–554.

Bass, B. M., & Avolio, B. J. (2000). *MLQ–Multifactor Leadership Questionnaire second edition sampler set*. Redwood City, CA: Mind Garden.

Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology*, *88*(2), 207.

Bathallath, S., Smedberg, Å., & Kjellin, H. (2016). Managing project interdependencies in IT/IS project portfolios: a review of managerial issues. *International Journal of Information Systems and Project Management*, *4*(1), 67–82.

Bayraktar, S., & Jiménez, A. (2020). Self-efficacy as a resource: a moderated mediation model of transformational leadership, extent of change and reactions to change. *Journal of Organizational Change Management*.

Beleiu, I., Crisan, E., & Nistor, R. (2015). Main factors influencing project success. *Interdisciplinary Management Research*, *11*(2), 59–72.

Bell, P., Coyne, J., & Merrington, S. (2013). Exploring ethics in intelligence and the role of leadership. *International Journal of Business and Commerce*, *2*(10), 27–37.

Belout, A., & Gauvreau, C. (2004). Factors influencing project success: the impact of human resource management. *International Journal of Project Management*, *22*(1), 1–11.

Bentahar, O., & Ika, L. A. (2019). Matching the Project Manager's Roles to Project Types: Evidence From Large Dam Projects in Africa. *IEEE Transactions on Engineering Management*, *67*(3), 830–845.

Bertelsen, S. (2003). Complexity–Construction in a new Perspective. *IGLC-11, Blacksburg, Virginia*.

Bhatti, S., & Kiyani, S. K. (2019). The Impact of Ethical Leadership on Project Success with Trust and Knowledge Sharing As Mediators. *Academy of Management Global Proceedings*, *2019*, 174.

Bhatti, S. H., Kiyani, S. K., Dust, S. B., & Zakariya, R. (2021). The impact of ethical leadership on project success: the mediating role of trust and knowledge sharing. *International Journal of Managing Projects in Business*.

Bjorvatn, T., & Wald, A. (2018). Project complexity and team-level absorptive capacity as drivers of project management performance. *International Journal of Project Management*, *36*(6), 876–888.

Boddy, D., & Paton, R. (2004). 'Responding to competing narratives: lessons for project managers. *International Journal of Project Management*, *22*(3), 225–233.

Bosch-Rekveldt, M., Jongkind, Y., Mooi, H., Bakker, H., & Verbraeck, A. (2011). Grasping project complexity in large engineering projects: The TOE (Technical, Organizational and Environmental) framework. *International Journal of Project Management*, *29*(6), 728–739.

Bourdieu, P. (1986). *The forms of capital. Cultural theory: An anthology*.

Brady, T., & Davies, A. (2014). Managing structural and dynamic complexity: A tale of two projects. *Project Management Journal*, *45*(4), 21–38.

Broady-Preston, J. (2009). Structuration and social identity theories: qualitative methodologies for determining skills and competencies for the information profession in the 21st century. *Performance Measurement and Metrics*.

Brooks, J., Waylen, K., & Mulder, M. (2012). How national context, project design, and local community characteristics influence success in community-based conservation projects. Proceedings of the National Academy of Sciences of the United States of America, 109(52), 21265-21270.

Brown, A. D., Colville, I., & Pye, A. (2015). Making sense of sensemaking in organization studies. *Organization Studies*, *36*(2), 265–277.

Brown, M. E., & Treviño, L. K. (2006). Ethical leadership: A review and future directions. *The Leadership Quarterly*, *17*(6), 595–616.

Brown, M. E., Treviño, L. K., & Harrison, D. A. (2005). Ethical leadership: A social learning perspective for construct development and testing. *Organizational Behavior and Human Decision Processes*, *97*(2), 117–134.

Brunet, M., & Forgues, D. (2019). Investigating collective sensemaking of a major project success. *International Journal of Managing Projects in Business*.

Burke, C. M., & Morley, M. J. (2016). On temporary organizations: A review, synthesis and research agenda. *Human Relations*, *69*(6), 1235–1258.

Castro, M. S., Bahli, B., Barcaui, A., & Figueiredo, R. (2020). Does one project success measure fit all? An empirical investigation of Brazilian projects. *International Journal of Managing Projects in Business*.

Chapman, R. J. (2016). A framework for examining the dimensions and characteristics of complexity inherent within rail megaprojects. *International Journal of Project Management*, *34*(6), 937–956.

Chia, R. (2000). Discourse analysis organizational analysis. *Organization*, *7*(3), 513–518.

Chiniara, M., & Bentein, K. (2016). Linking servant leadership to individual performance: Differentiating the mediating role of autonomy, competence and relatedness need satisfaction. *The Leadership Quarterly*, *27*(1), 124–141.

Chiocchio, F., & Essiembre, H. (2009). Cohesion and performance: A meta-analytic review of disparities between project teams, production teams, and service teams. *Small Group Research*, *40*(4), 382–420.

Cicmil, S., Cooke-Davies, T., Crawford, L., & Antony, K. (2009). *Exploring the complexity of projects: Implications of complexity theory for project management practice*.

Cilliers, P. (2000). What can we learn from a theory of complexity? *Emergence*, *2*(1), 23–33.

Cilliers, P. (2001). Boundaries, hierarchies and networks in complex systems. *International Journal of Innovation Management*, *5*(02), 135–147.

Ciulla, J. B. (2013). Leadership ethics. *International Encyclopedia of Ethics*, 1–7.

Cleden, M. D. (2012). *Managing project uncertainty*. Gower Publishing, Ltd.

Cleveland, S., & Cleveland, M. (2020). Leadership Competencies for Sustained Project Success. *International Journal of Applied Management Theory and Research (IJAMTR)*, *2*(1), 35–47.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, S95–S120.

Cooke-Davies, T. (2013). Can knowledge sharing mitigate the effect of construction project complexity?. *Construction Innovation*, *13*(1), 5 – 9.

Cooke-Davies, T. (2002). The "real" success factors on projects. *International Journal of Project Management*, *20*(3), 185–190.

Cooper, D.R., & Schindler, P.S. (2014) *Business Research Methods*. *12th Edition.* McGraw Hill International Edition, New York.

Creswell, J., & Plano Clark, V. (2007). *Designing and Conducting Mixed Methods Research*. Thousand Oaks, CA: Sage.

Cullen, C., & Leavy, B. (2017). The lived experience of project leadership in a loosely coupled transient context. *International Journal of Managing Projects in Business*.

Curran, C., Niedergassel, B., Picker, S., & Leker, J. (2009). Project leadership skills in cooperative projects. *Management Research News*.

Custovic, E. (2015). Engineering management: Old story, new demands. *IEEE Engineering Management Review*, *43*(2), 21–23.

Damasiotis, V., & Fitsilis, P. (2019). Project management guidelines/frameworks in the era of agility and complexity. In *Smart City Emergence* (pp. 1–20). Elsevier.

Damoah, I. S., & Akwei, C. (2017). Government project failure in Ghana: a multidimensional approach. *International Journal of Managing Projects in Business*.

Damoah, I. S., Akwei, C., & Mouzughi, Y. (2015). Causes of government project failure in developing countries–Focus on Ghana. *British Academy of Management (BAM) Conference*, 1–10.

Damoah, I. S., & Kumi, D. K. (2018). Causes of government construction projects failure in an emerging economy: Evidence from Ghana. *International Journal of Managing Projects in Business*.

Damoah, I. S., Mouzughi, Y., & Kumi, D. K. (2020). The effects of government construction projects abandonment: stakeholders' perspective. *International Journal of Construction Management*, *20*(5), 462–479.

Dang, D. Y., Gadi, P. D., & Danladi, M. Z. (2013). Integrating Leadership And Ethics: Consequences And Implications In Achieving Results In The Private Sector. *International Journal of Education and Research*, *1*, 0–10.

Daniel, C. O., & Ibrahim, A. U. (2019). Project failure and its influence on the performance of construction firms in Nigeria. *International Journal of Research in Business, Economics and Management*, *3*(2), 86-95.

Dao, B., Kermanshachi, S., Shane, J., & Anderson, S. (2016). Project complexity assessment and management tool. *Procedia Engineering*, *145*, 491-496.

Dao, B., Kermanshachi, S., Shane, J., Anderson, S., & Hare, E. (2017). Exploring and assessing project complexity. *Journal of Construction Engineering and Management*, *143*(5), 04016126.

Dao, B., Kermanshachi, S., Shane, J., Anderson, S., & Hare, E. (2016). Identifying and measuring project complexity. *Procedia Engineering*, *145*, 476–482.

de Carvalho, M. M., Patah, L. A., & de Souza Bido, D. (2015). Project management and its effects on project success: Cross-country and cross-industry comparisons. *International Journal of Project Management*, *33*(7), 1509–1522.

De Klerk, J. J. (2012). Improvement interventions: To what extent are they manifestations of social defences? *SA Journal of Industrial Psychology*, *38*(2), 1–10.

De Klerk, M. (2014). Project management or project leadership. *Project Management: A Behavioural Perspective*, 61–96.

de los Ríos-Carmenado, I., Guillén-Torres, J., & Herrera-Reyes, A.-T. (2013). Complexity in the management of rural development projects: Case of LASESA (Spain). *Cuadernos de Desarrollo Rural*, *10*(71), 167–186.

Demirel, H. Ç., Leendertse, W., Volker, L., & Hertogh, M. (2017). Flexibility in PPP contracts–Dealing with potential change in the pre-contract phase of a construction project. *Construction management and economics*, *35*(4), 196-206.

de Rezende, L. B., & Blackwell, P. (2019). Revisiting project complexity: a new dimension and framework. *The Journal of Modern Project Management*, *6*(3).

de Souza Pinto, J., Novaski, O., Anholon, R., & Besteiro, É. N. C. (2014). Measuring project complexity and uncertainty: Scale proposal. *Business Management Dynamics*, *4*(1), 29.

de Vries, M. F. R. K. (2007). Decoding the Team Conundrum:: The Eight Roles Executives Play. *Organizational Dynamics*, *36*(1), 28–44.

Di Vincenzo, F., & Mascia, D. (2012). Social capital in project-based organizations: Its role, structure, and impact on project performance. *International Journal of Project Management*, *30*(1), 5–14.

Doan, T. T. T., Nguyen, L. C. T., & Nguyen, T. D. N. (2020). Emotional Intelligence and Project Success: The Roles of Transformational Leadership and Organizational Commitment. *The Journal of Asian Finance, Economics, and Business*, *7*(3), 223–233.

Drouin, N., Müller, R., & Sankaran, S. (2018). Balancing vertical and horizontal leadership in projects: Empirical studies from Australia, Canada, Norway and Sweden. *International Journal of Managing Projects in Business*. https://doi.org/10.1108/IJMPB-01-2018-0002

Dulaimi, M. F., Nepal, M. P., & Park, M. (2005). A hierarchical structural model of assessing innovation and project performance. *Construction Management and Economics*, *23*(6), 565–577.

Dunović, I. B., Radujković, M., & Škreb, K. A. (2014). 27 th IPMA World Congress Towards a new model of complexity-the case of large infrastructure projects. *Procedia-Social and Behavioral Sciences*, *119*, 730–738.

Duodu, A. A. (2017). *Management of delays in construction projects in Bia West District*.

Durdyev, S., & Hosseini, M. R. (2019). Causes of delays on construction projects: a comprehensive list. *International Journal of Managing Projects in Business*.

Dvir, D. O. V, Sadeh, A., & Malach-Pines, A. (2006). Projects and project managers: The relationship between project managers' personality, project types, and project success. *Project Management Journal*, *37*(5), 36–48.

Ebekozien, A. (2020). Corrupt acts in the Nigerian construction industry: is the ruling party fighting

corruption? *Journal of Contemporary African Studies*, 1–18.

Efatmaneshnik, M., Nilchiani, R., & Heydari, B. (2012). From complicated to complex uncertainties in system of systems. *2012 IEEE International Systems Conference SysCon 2012*, 1–6.

Eja, K. M., & Ramegowda, M. (2020). Government project failure in developing countries: A review with particular reference to Nigeria. *Global Journal of Social Sciences*, *19*, 35-47.

Ellinas, C., Allan, N., & Johansson, A. (2016). Toward project com plexity evaluation: A structural perspective. *IEEE Systems Journal*, *12*(1), 228–239.

Emery, C. R., & Barker, K. J. (2007). The effect of transactional and transformational leadership styles on the organizational commitment and job satisfaction of customer contact personnel. *Journal of Organizational Culture, Communications and Conflict*, *11*(1), 77.

Enninga, T., & Lugt, R. V. D. (2016). The Innovation Journey and the Skipper of the Raft: About the Role of Narratives in Innovation Project Leadership. *Project Management Journal*, *47*(2), 103–114. https://doi.org/10.1002/pmj.21578

Enyinda, C. I. (2017). Quantitative risk analysis for international project management and programs in an emerging economy. In *Leadership, Innovation and Entrepreneurship as Driving Forces of the Global Economy* (pp. 769-780). Springer, Cham.

Erkutlu, H. (2008). The impact of transformational leadership on organizational and leadership effectiveness: The Turkish case. *Journal of Management Development*, *27*(7), 708–726.

Famakin, I. O., & Abisuga, A. O. (2016). Effect of path-goal leadership styles on the commitment of employees on construction projects. *International Journal of Construction Management*, *16*(1), 67–76.

Famiyeh, S., Amoatey, C. T., Adaku, E., & Agbenohevi, C. S. (2017). Major causes of construction time and cost overruns: A case of selected educational sector projects in Ghana. *Journal of Engineering, Design and Technology*, *15*(2), 181–198.

Farrell, P., & Gale, A. (2000). The site manager: role, education and training in the UK. *Journal of Construction Research*, *1*(1), 43–52.

Fellows, R., & Liu, A. M. M. (2017). 'What does this mean'? Sensemaking in the strategic action field

of construction. *Construction Management and Economics*, *35*(8–9), 578–596.

Ferdoush, M. A. (2020). *Structuration Theory*.

Fernández-Solís, J. L. (2008). The systemic nature of the construction industry. *Architectural Engineering and Design Management*, *4*(1), 31–46.

Floricel, S., Bonneau, C., Aubry, M., & Sergi, V. (2014). Extending project management research: Insights from social theories. *International Journal of Project Management*, *32*(7), 1091–1107.

Floricel, S., Michela, J. L., & Piperca, S. (2016). Complexity, uncertainty-reduction strategies, and project performance. *International Journal of Project Management*, *34*(7), 1360–1383.

Foulkes, A., & Ruddock, L. (2007). Defining the Scope of the Construction Sector. *Proceedings of the 8th IPGR Conference, Salford*.

Frimpong, Y., Oluwoye, J., & Crawford, L. (2003). Causes of delay and cost overruns in construction of groundwater projects in a developing countries; Ghana as a case study. *International Journal of Project Management*, *21*(5), 321–326.

Fugar, F. D. K., & Agyakwah-Baah, A. B. (2010). Delays in building construction projects in Ghana. *Construction Economics and Building*, *10*(1–2), 103–116.

Gacasan, E. M. P., Wiggins, M. W., & Searle, B. J. (2016). The role of cues in expert project manager sensemaking. *Construction Management and Economics*, *34*(7–8), 492–507.

Gamil, Y., & Abdul Rahman, I. (2020). Assessment of critical factors contributing to construction failure in Yemen. *International Journal of Construction Management*, *20*(5), 429-436.

Geoghegan, L., & Dulewicz, V. (2008). Do project managers' leadership competencies contribute to project success? *Project Management Journal*, *39*(4), 58–67.

Geraldi, J., & Adlbrecht, G. (2008). On faith, fact, and interaction in projects. *IEEE Engineering Management Review*, *36*(2), 35–49. https://doi.org/10.1109/EMR.2008.4534318

Geraldi, J. G., & Adlbrecht, G. (2007). On faith, fact, and interaction in projects. *Project Management Journal*, *38*(1), 32–43.

Geraldi, J., Maylor, H., & Williams, T. (2011a). Now, let's make it really complex (complicated).

International Journal of Operations & Production Management.

Geraldi, J., Maylor, H., & Williams, T. (2011b). Now, let's make it really complex (complicated) A systematic review of the complexities of projects. *International Journal of Operations & Production Management*, *31*(9), 966–990.

Ghosh, S., & Bhowmick, B. (2014). Technological uncertainty: Exploring factors in Indian start-ups. *IEEE Global Humanitarian Technology Conference (GHTC 2014)*, 425–432.

Giddens, A. (1979). *Central problems in social theory: Action, structure, and contradiction in social analysis* (Vol. 241). Univ of California Press.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Univ of California Press.

GSS 2012: *2010 Population and housing census: Summary of final results*. Ghana Statistical Service.

Gumusluoglu, L., & Ilsev, A. (2009). Transformational leadership, creativity, and organizational innovation. *Journal of Business Research*, *62*(4), 461–473.

Handley-Schachler, M., & Gao, S. S. (2003). Can the private finance initiative be used in emerging economies?–lessons from the UK's successes and failures. *Managerial Finance*.

Hanisch, B., & Wald, A. (2014). Effects of complexity on the success of temporary organizations: Relationship quality and transparency as substitutes for formal coordination mechanisms. *Scandinavian Journal of Management*, *30*(2), 197–213.

Hansen, S. W. (2014). Common pool size and project size: An empirical test on expenditures using Danish municipal mergers. *Public Choice*, *159*(1–2), 3–21.

Hassan, M. M., Bashir, S., & Abbas, S. M. (2017). The Impact of Project Managers' Personality on Project Success in NGOs: The Mediating Role of Transformational Leadership. *Project Management Journal*, *48*(2), 74–87. https://doi.org/10.1177/875697281704800206

Hasse, G. W., & Bekker, M. C. (2016). Chaos attractors as an alignment mechanism between projects and organizational strategy. *Procedia-Social and Behavioral Sciences*, *226*, 91–99.

Havermans, L., Van der Heijden, B. I. J. M., Savelsbergh, C., & Storm, P. (2019). Rolling into the profession: Exploring the motivation and experience of becoming a project manager. *Project*

Management Journal, *50*(3), 346–360.

Heath, M., & Porter, T. (2019). Sensemaking through a storytelling lens: Physician perspectives of health information exchange. *Qualitative Research in Organizations and Management*, *14*(4), 428–443.

He, Q., Chen, X., Wang, G., Zhu, J., Yang, D., Liu, X., & Li, Y. (2019). Managing social responsibility for sustainability in megaprojects: An innovation transitions perspective on success. *Journal of Cleaner Production*, *241*, 118395.

Heravi, G., & Ilbeigi, M. (2012). Development of a comprehensive model for construction project success evaluation by contractors. Engineering, Construction and Architectural Management.

Herold, D. M., Fedor, D. B., Caldwell, S., & Liu, Y. (2008). The effects of transformational and change leadership on employees' commitment to a change: A multilevel study. *Journal of Applied Psychology*, *93*(2), 346.

Hinojosa, J., Kramer, P., & Royeen, C. B. (2017). The Complexity of Occupation. *Perspectives on Human Occupations: Theories Underlying Practice*, 1.

Hill, C. E., Knox, S., Thompson, B. J., Williams, E. N., Hess, S. A., & Ladany, N. (2005). Consensual qualitative research: An update. *Journal of Counseling Psychology*, *52*, 196205.

Hogg, M. A. (2016). Social identity theory. In *Understanding peace and conflict through social identity theory* (pp. 3–17). Springer.

Hogg, M. A., & Cooper, J. (2003). *The Sage handbook of social psychology*. Sage.

Hu, Z., Wu, G., Zhao, X., Zuo, J., & Wen, S. (2021). How does the strength of ties influence relationship quality in Chinese megaprojects? The mediating role of contractual flexibility. *Baltic Journal of Management*, 16 (3), 366 – 385.

Ibrahim, A. R. Bin, Roy, M. H., Ahmed, Z. U., & Imtiaz, G. (2010). Analyzing the dynamics of the global construction industry: past, present and future. *Benchmarking: An International Journal*, *17*(2), 232–252. https://doi.org/10.1108/14635771011036320

Ika, L. A. (2009). Project success as a topic in project management journals. *Project Management Journal*, *40*(4), 6-19.

Ika, L.A., Diallo, A. and Thuillier, D. (2012) Critical success factors for World Bank projects: an empirical investigation, *International Journal of Project Management, 30(* 1), 105-116.

Imran, S. M. J. I., Nawaz, M. S., Siddiqui, S. H., & Kashif, M. (2019). Does Project Teamwork Matter? Investigating the Relationship between Transformational Leadership and Project Success. *Journal of Management Sciences*, *6*(1), 79–95.

Iqbal, S. M. J., Zaman, U., Siddiqui, S. H., & Imran, M. K. (2019). Influence of transformational leadership factors on project success. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, *13*(1), 231–256.

Irfan, M., Khan, S. Z., Hassan, N., Hassan, M., Habib, M., Khan, S., & Khan, H. H. (2021). Role of project planning and project manager competencies on public sector project success. *Sustainability*, *13*(3), 1421.

Ishtiaq, F., & Jahanzaib, M. (2017). Impact of Project Complexity and Environmental Factors on Project Success: A Case of Oil and Gas Sector of Pakistan. *Journal of Basic and Applied Sciences*, *13*, 351–358.

Jaiswal, N. K., & Dhar, R. L. (2015). Transformational leadership, innovation climate, creative self-efficacy and employee creativity: A multilevel study. *International Journal of Hospitality Management*, *51*, 30–41.

Javed, B., Khan, A. A., Bashir, S., & Arjoon, S. (2017). Impact of ethical leadership on creativity: the role of psychological empowerment. *Current Issues in Tourism*, *20*(8), 839–851.

Jiang, J. (2014). The study of the relationship between leadership style and project success. *American Journal of Trade and Policy*, *1*(1), 51–55.

Joslin, R., & Müller, R. (2015). Relationships between a project management methodology and project success in different project governance contexts. *International Journal of Project Management*, *33*(6), 1377–1392.

Joslin, R., & Müller, R. (2016a). The impact of project methodologies on project success in different project environments. *International Journal of Managing Projects in Business*.

Joslin, R., & Müller, R. (2016b). The impact of project methodologies on project success in different project environments. *International Journal of Managing Projects in Business*, *9*(2), 364–388.

https://doi.org/10.1108/IJMPB-03-2015-0025

Kamensky, J. M. (2011). Managing the Complicated vs. the Complex. *The Business of Government Magazine*, 66–67.

Kermanshachi, S., Dao, B., Shane, J., & Anderson, S. (2016). Project complexity indicators and management strategies–a Delphi study. *Procedia Engineering*, *145*, 587–594.

Kermanshachi, S., & Safapour, E. (2019). Identification and quantification of project complexity from perspective of primary stakeholders in US construction projects. *Journal of Civil Engineering and Management*, *25*(4), 380–398.

Kerzner, H. (2017). *Project management: a systems approach to planning, scheduling, and controlling*. John Wiley & Sons.

Khattak, M. S., & Mustafa, U. (2019). Management competencies, complexities and performance in engineering infrastructure projects of Pakistan. *Engineering, Construction and Architectural Management*, 26(7), 1321 – 1347.

Killen, C. P. (2017). Managing portfolio interdependencies. *International Journal of Managing Projects in Business*.

Kissi, J., Dainty, A., & Tuuli, M. (2013). Examining the role of transformational leadership of portfolio managers in project performance. *International Journal of Project Management*, *31*(4), 485–497.

Kline, R. B. (2005). Principles and practice of structural equation modeling. 2005. *New York, NY: Guilford*, *2*.

Krog, C. L., & Govender, K. (2015). The relationship between servant leadership and employee empowerment, commitment, trust and innovative behaviour: A project management perspective. *SA Journal of Human Resource Management*, *13*(1), 1–12.

LaDonna, K. A., Artino, A. R., & Balmer, D. F. (2021). Beyond the guise of saturation: Rigor and qualitative interview data. *Journal of Graduate Medical Education*, *13*(5), 607–611. https://doi.org/10.4300/jgme-d-21-00752.1.

Lasrado, F. (2020). Let's get everyone involved! The effects of transformational leadership and

organizational culture on organizational excellence. *International Journal of Quality & Reliability Management*.

Lee, J., Park, J.-G., & Lee, S. (2015). Raising team social capital with knowledge and communication in information systems development projects. *International Journal of Project Management*, *33*(4), 797–807.

Lee, J.H., Park, K.-S., Kim, R.-B., Kim, B.-J., & Chun, J.-H. (2011). The influence of individual-level social capital on depression. *Journal of Agricultural Medicine and Community Health*, *36*(2), 73–86.

Lee, M. R. (2009). E-ethical leadership for virtual project teams. *International Journal of Project Management*, *27*(5), 456–463.

Lehtiranta, L., Kärnä, S., Junnonen, J.-M., & Julin, P. (2012). The role of multi-firm satisfaction in construction project success. *Construction Management and Economics*, *30*(6), 463–475.

Limsila, K., & Ogunlana, S. O. (2008). Linking personal competencies with transformational leadership style evidence from the construction industry in Thailand. *Journal of Construction in Developing Countries*, *13*(1), 27–50.

Lincoln, Y., & Guba, E. (1985). Naturalistic inquiry. New York: Sage.

Liphadzi, M., Aigbavboa, C., & Thwala, W. (2015). Relationship between leadership styles and project success in the South Africa construction industry. *Procedia Engineering*, *123*, 284–290.

Littman, M. J., & Littman, E. S. (2017). Six Ethical Leadership Strategies for Project Management Success. *Project Management Development–Practice and Perspectives*, 153.

Lu, C., Yu, Z., Wang, X., & Hong, Y. (2020). Empirical study on the obstacles to the success of joint ventures in construction projects. *Advances in Civil Engineering*, *2020*.

Lu, Y., Luo, L., Wang, H., Le, Y., & Shi, Q. (2015). Measurement model of project complexity for large-scale projects from task and organization perspective. *International Journal of Project Management*, *33*(3), 610–622.

Lukhele, T., Botha, B., & Mbanga, S. (2021). Exploring Project Complexity Relations to Scope Changes in Construction Projects: A Case Study of NEC Projects in South Africa. *Construction Economics and Building*, *21*(2).

Luo, L., He, Q., Jaselskis, E. J., & Xie, J. (2017). Construction project complexity: research trends and implications. *Journal of construction engineering and management*, *143*(7), 04017019.

Luo, L., He, Q., Xie, J., Yang, D., & Wu, G. (2017). Investigating the relationship between project complexity and success in complex construction projects. *Journal of Management in Engineering*, *33*(2), 4016036.

Luo, L., Zhang, L., & He, Q. (2020). Linking project complexity to project success: a hybrid SEM–FCM method. *Engineering, Construction and Architectural Management*, 27(9), 2591 – 2614.

Louw, W., Steyn, H., Wium, J. A., & Gevers, W. (2021). Executive sponsor attributes and megaproject success. *International Journal of Project Organisation and Management*, *13*(1), 1–30.

Luthans, F. (2002). Positive organizational behavior: Developing and managing psychological strengths. *Academy of Management Perspectives*, *16*(1), 57–72.

Ma, L., & Fu, H. (2020). Exploring the influence of project complexity on the mega construction project success: a qualitative comparative analysis (QCA) method. *Engineering, Construction and Architectural Management*.

Maier, M. W., Rainey, L. B., & Tolk, A. (2015). The role of modeling and simulation in system of systems development. *Modeling and Simulation Support for System of Systems Engineering Applications*, 11–41.

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, *26*(13), 1753–1760. https://doi.org/10.1177/1049732315617444.

Manning, S. (2008). Embedding projects in multiple contexts–a structuration perspective. *International Journal of Project Management*, *26*(1), 30–37.

Maqbool, R., Sudong, Y., Manzoor, N., & Rashid, Y. (2017b). The Impact of Emotional Intelligence, Project Managers' Competencies, and Transformational Leadership on Project Success: An Empirical Perspective. *Project Management Journal*, *48*(3), 58–75. https://doi.org/10.1177/875697281704800304

Maseko, C. M. (2017). Identification of risk factors affecting construction of projects: the case of emerging economy. *Risk Governance and Control: Financial Markets & Institutions*, *7*(4), 247-260.

Maseko, B. M., van Wyk, R., & Odendaal, A. (2019). Team coaching in the workplace: Critical success factors for implementation. *SA Journal of Human Resource Management*, *17*(1), 1–11.

Masood, Z., & Farooq, S. (2017). The benefits and key challenges of agile project management under recent research opportunities. *International Research Journal of Management Sciences*, *5*(1), 20–28.

Matloob, M. (2018). Impact of Ethical Leadership on Project Success: Mediating role of Employee Trust and Moderating role of Ethical Orientation. *Jinnah Business Review*, *6*(1), 42–49.

Maylor, H., Vidgen, R., & Carver, S. (2008). Managerial complexity in project-based operations: A grounded model and its implications for practice. *Project Management Journal*, *39*(1_suppl), S15–S26.

McCann, A. B. (2017). *The relevance of project management best practice and its application in the UK construction industry*. University of Salford.

McCleskey, J. A. (2014). Situational, transformational, and transactional leadership and leadership development. *Journal of Business Studies Quarterly*, *5*(4), 117.

McPhee, R. D., & Canary, H. E. (2016). Structuration theory. *The International Encyclopedia of Communication Theory and Philosophy*, 1–15.

Menapace, M. (2019). Scientific ethics: A new approach. *Science and Engineering Ethics*, *25*(4), 1193–1216.

Meng, X., & Boyd, P. (2017). The role of the project manager in relationship management. *International Journal of Project Management*, *35*(5), 717–728.

Mills, A. (2001). A systematic approach to risk management for construction. *Structural Survey*.

MoRH (2015). *Ministry of Roads and Highway Polic Document*, Ghana.

MoWH (2015). *Ministry of Works and Housing Policy Document*, Ghana.

Mohseni, M., Tabassi, A. A., Kamal, E. M., Bryde, D. J., & Michaelides, R. (2019). Complexity factors in mega projects: a literature review. *European Proceedings of Multidisciplinary Sciences*, *2*(6), 54–67.

Moore, C. B., Payne, G. T., Autry, C. W., & Griffis, S. E. (2018). Project complexity and bonding social capital in network organizations. *Group & Organization Management*, *43*(6), 936–970.

Mozaffari, M., Fazli, S., & Sedaghat-Seresht, A. (2012). Identifying the most critical project complexity factors using Delphi method: the Iranian construction industry. *Management Science Letters*, *2*(8), 2945–2952.

Mukuka, M., Aigbavboa, C., & Thwala, W. (2015). Effects of construction projects schedule overruns: A case of the Gauteng Province, South Africa. *Procedia Manufacturing*, *3*, 1690–1695.

Müller, R., Geraldi, J., & Turner, J. R. (2011). Relationships between leadership and success in different types of project complexities. *IEEE Transactions on Engineering Management*, *59*(1), 77–90.

Müller, R., & Jugdev, K. (2012). Critical success factors in projects: Pinto, Slevin, and Prescott–the elucidation of project success. *International Journal of Managing Projects in Business*, *5*(4), 757–775.

Müller, R., & Turner, R. (2010). Leadership competency profiles of successful project managers. *International Journal of Project Management*, *28*(5), 437–448.

Müller, R., & Turner, J. R. (2007). Matching the project manager's leadership style to project type. *International Journal of Project Management*, *25*(1), 21–32.

Naeem, S., & Khanzada, B. (2017). Impact of Transformational Leadership in Attainment of Project Success : The Mediating Role of Job Satisfaction. *International Journal of Business and Social Science*, *8*(9), 168–177.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, *23*(2), 242–266.

Narayanan, V. K., & Huemann, M. (2021). Engaging the organizational field: the case of project practices in a construction firm to contribute to an emerging economy. *International Journal of Project Management*.

Nassar, K. M., & Hegab, M. Y. (2006). Developing a complexity measure for project schedules. *Journal of Construction Engineering and Management*, *132*(6), 554–561.

Nejati, M., Brown, M. E., Shafaei, A., & Seet, P.-S. (2020). Employees' perceptions of corporate social responsibility and ethical leadership: are they uniquely related to turnover intention? *Social Responsibility Journal*.

Ng, C. T., & Walker, D. H. T. (2008). A study of project management leadership styles across life cycle stages of an IT project in Hong Kong. *International Journal of Managing Projects in Business*.

Nguyen, L. D., Le-Hoai, L., Tran, D. Q., Dang, C. N., & Nguyen, C. V. (2019). Effect of project complexity on cost and schedule performance in transportation projects. *Construction Management and Economics*, *37*(7), 384–399.

Nixon, P., Harrington, M., & Parker, D. (2012a). Leadership performance is significant to project success or failure: a critical analysis. *International Journal of Productivity and Performance Management*.

Nixon, P., Harrington, M., & Parker, D. (2012b). Leadership performance is significant to project success or failure: A critical analysis. *International Journal of Productivity and Performance Management*, *61*(2), 204–216. https://doi.org/10.1108/17410401211194699

Northouse, P. G. (2007). Transformational leadership. *Leadership: Theory and Practice*, *4*, 175–206.

Novo, B., Landis, E. A., & Haley, M. L. (2017). Leadership and its role in the success of project management. *Journal of Leadership, Accountability, and Ethics*, *14*(1), 73–78.

Nubuor, S. A., Hongyi, X., & Frimpong, S. K. (2017). Research on Project Success Factors within the Construction Industry of Ghana: Evidence from Wide Horizon Ghana Limited. *International Journal of Management Science and Business Administration*, *3*(5), 38–43.

O'Donnell, J. G. (2010). *A study of the relationships among project managers' leadership practices, project complexity, and project success*. Argosy University/Seattle.

Obeidat, B. Y., & Tarhini, A. (2016). A Jordanian empirical study of the associations among transformational leadership, transactional leadership, knowledge sharing, job performance, and firm performance. *Journal of Management Development*.

Odeneye, A. S., Hoon, S. N., & Phlypo, K. S. (2018). Perceptions of Followers About Ethical Leadership and Attendant Effects on Organizational Success. *Journal of Social Change*, *10*(1), 5.

Ofori-Kuragu, J. K., Baiden, B. K., & Badu, E. (2016). Key performance indicators for project success in Ghanaian contractors. *International Journal of Construction Engineering and Management*, *5*(1), 1–10.

Ofori, D. (2014). An exploratory study of project management competency in Ghana. *Journal of African Business*, *15*(3), 197–210.

Ofori, G. (2012a). Developing the construction industry in Ghana: the case for a central agency. *National University of Singapore Omega*.

Ofori, G. (2012b). Developing the Construction Industry in Ghana: the case for a central agency. *A Concept Paper Prepared for Improving the Construction Industry in Ghana. National University of Singapore*, 3–18.

Ogunde, A., Olaolu, O., Afolabi, A. O., Owolabi, J., & Ojelabi, R. A. (2017). Challenges confronting construction project management system for sustainable construction in developing countries: Professionals perspectives (a case study of Nigeria). *Journal of Building Performance*, *8*(1), 1–11.

Oh, J., Lee, H., & Zo, H. (2019). The effect of leadership and teamwork on ISD project success. *Journal of Computer Information Systems*, 1–11.

Ojokuku, R. M., Odetayo, T. A., & Sajuyigbe, A. S. (2012). Impact of leadership style on organizational performance: a case study of Nigerian banks. *American Journal of Business and Management*, *1*(4), 202–207.

Omonyo, A. B. (2019). *Moderating Role of Project Leadership on the Influence of Complexity on Success of Public Infrastructural Megaprojects in Kenya*. JKUAT-COHRED.

Osabutey, E. L. C., Williams, K., & Debrah, Y. A. (2014). The potential for technology and knowledge transfers between foreign and local firms: A study of the construction industry in Ghana. *Journal of World Business*, *49*(4), 560–571.

Owens, B. P., & Hekman, D. R. (2012). Enacting humble leadership: An inductive examination of humble leader behaviors, outcomes, and contingencies. *Academy of Management Journal*, *55*(4), 787–818.

Owens, B.P. and Hekman, D.R. (2016), "How does leader humility influence team performance? Exploring the mechanisms of contagion and collective promotion focus", *Academy of Management Journal*, Vol. 59 No. 3, pp. 1088-1111.

Para-González, L., Jiménez-Jiménez, D., & Martínez-Lorente, A. R. (2018). Exploring the mediating effects between transformational leadership and organizational performance. *Employee Relations*.

Pargar, F., Kujala, J., Aaltonen, K., & Ruutu, S. (2019). Value creation dynamics in a project alliance. *International Journal of Project Management*, *37*(5), 716–730.

Parsons-Hann, H., & Liu, K. (2005). Measuring requirements complexity to increase the probability of project success. *International Conference on Enterprise Information Systems*, *4*, 434–438.

Patanakul, P., Kwak, Y. H., Zwikael, O., & Liu, M. (2016). What impacts the performance of large-scale government projects? *International Journal of Project Management*, *34*(3), 452–466.

Perminiva, O., Gustafsson, M., & Wikstrom, K. (2008). Defining Uncertainty in projects: a new perspective. *International Journal of Project Management*, *26*(2008), 73–79.

Pinto, A., Nunes, I. L., & Ribeiro, R. A. (2011). Occupational risk assessment in construction industry–Overview and reflection. *Safety Science*, *49*(5), 616–624.

Pinto, J. K., & Mantel, S. J. (1990). The causes of project failure. *IEEE Transactions on Engineering Management*, *37*(4), 269–276.

Pinto, J. K., & Slevin, D. P. (2006). Project critical success factors: The project implementation profile. *Global Project Management Handbook–Planning, Organizing, and Controlling International Projects*, 11–13.

PMI. (2007). A Guide to the Project Management Body of Knowledge (PMBOK® Guide). 4th ed. Newton Square, PA: Project Management Institute, USA.

PMI. (2013). A Guide to the Project Management Body of Knowledge (PMBOK® Guide). 5th ed. Newton Square, PA: Project Management Institute, USA.

Podgórska, M., & Pichlak, M. (2019a). Analysis of project managers' leadership competencies: Project success relation: what are the competencies of polish project leaders? *International*

Journal of Managing Projects in Business.

Podgórska, M., & Pichlak, M. (2019b). Analysis of project managers' leadership competencies. *International Journal of Managing Projects in Business*.

Politis, J. D. (2002). Transformational and transactional leadership enabling (disabling) knowledge acquisition of self-managed teams: the consequences for performance. *Leadership & Organization Development Journal*.

Pollack, J. (2007). The changing paradigms of project management. *International Journal of Project Management*, *25*(3), 266–274.

Prabhakar, G. P. (2005). Switch leadership in projects an empirical study reflecting the importance of transformational leadership on project success across twenty-eight nations. *Project Management Journal*, *36*(4), 53–60.

Prabhakar, G. P. (2008). What is project success: a literature review. *International Journal of Business and Management*, *3*(9).

Prasad, B., & Junni, P. (2016). CEO transformational and transactional leadership and organizational innovation. *Management Decision*.

Price II, W.N. (2020). The Cost of Novelty. 120 Colum, L.Rev 769, *University of Michigan Public Law Research Paper* No. 633

Pring, C., & Vrushi, J. (2019). Global Corruption Barometer: Africa 2019. *Transparency International*.

Puddicombe, M. S. (2012). Novelty and technical complexity: Critical constructs in capital projects. *Journal of Construction Engineering and Management*, *138*(5), 613–620.

Qazi, A., Quigley, J., Dickson, A., & Kirytopoulos, K. (2016). Project Complexity and Risk Management (ProCRiM): Towards modelling project complexity driven risk paths in construction projects. *International Journal of Project Management*. https://doi.org/10.1016/j.ijproman.2016.05.008

Qi, Y., & Ming-Xia, L. (2014). Ethical leadership, organizational identification and employee voice: Examining moderated mediation process in the Chinese insurance industry. *Asia Pacific Business Review*, *20*(2), 231–248.

Qureshi, S. M., & Kang, C. (2015). Analysing the organizational factors of project complexity using

structural equation modelling. *International Journal of Project Management*, *33*(1), 165–176.

Radujković, M., & Sjekavica, M. (2017). Project management success factors. *Procedia Engineering*, *196*, 607–615.

Ramlee, N., Tammy, N. J., Raja Mohd Noor, R. N. H., Ainun Musir, A., Abdul Karim, N., Chan, H. B., & Mohd Nasir, S. R. (2016). Critical success factors for construction project. *AIP Conference Proceedings*, *1774*(1), 30011.

Ramos, P. A., & Mota, C. M. de M. (2016). Exploratory study regarding how cultural perspectives can influence the perceptions of project success in Brazilian companies. *Production*, *26*(1), 105–114.

Ranawat, H. S., Bhadoriya, G., & Trivedi, M. K. (2018). Critical Factors Which are Affecting the Success of Construction Project in Gwalior Division, India. *International Journal of Applied Engineering Research*, *13*(11), 10108–10114.

Rausch, E., Barber, E., & Warn, J. (2005). Leadership in project management: from firefighter to firelighter. *Management Decision*.

Raziq, M. M., Borini, F. M., Malik, O. F., Ahmad, M., & Shabaz, M. (2018). Leadership styles, goal clarity, and project success: Evidence from project-based organizations in Pakistan. *Leadership & Organization Development Journal, 39*(2), 309–323.

Remington, K., Zolin, R., & Turner, R. (2009). A model of project complexity: distinguishing dimensions of complexity from severity. *Proceedings of the 9th International Research Network of Project Management Conference*, *11*(13.10).

Ren, S., Tang, G., & Jackson, S. E. (2020). Effects of Green HRM and CEO ethical leadership on organizations' environmental performance. *International Journal of Manpower*.

Rezvani, A., Chang, A., Wiewiora, A., Ashkanasy, N. M., Jordan, P. J., & Zolin, R. (2016). Manager emotional intelligence and project success: The mediating role of job satisfaction and trust. *International Journal of Project Management*, *34*(7), 1112–1122.

Ribeiro, A., Amaral, A., & Barros, T. (2021). Project Manager Competencies in the context of the Industry 4.0. *Procedia Computer Science*, *181*, 803–810.

Rizk, R., Sobh, D., & Abd Allah Abou Yassin, F. H. (2018). Studying the Mindset of Corruption in the Construction Industry-A Lean Perspective. *Proc., 26th Annual Conference of the International Group for Lean Construction*, 316–325.

Rogers, K. H., Luton, R., Biggs, H., Biggs, R., Blignaut, S., Choles, A. G., Palmer, C. G., & Tangwe, P. (2013). Fostering complexity thinking in action research for change in social–ecological systems. *Ecology and Society*, *18*(2).

Rose, K. H., & Greg, I. (2009). *Book Review: Work Breakdown Structures for Projects, Programs, and Enterprises*. SAGE Publications Sage CA: Los Angeles, CA.

Ruoslahti, H. (2020). Complexity in project co-creation of knowledge for innovation. *Journal of Innovation & Knowledge*, *5*(4), 228–235.

Sackey, E., Tuuli, M. M., & Dainty, A. (2011). A spatiotemporal perspective on empowerment in projects. *Management and Innovation for a Sustainable Built Environment MISBE*, 20–23.

Saha, R., Cerchione, R., Singh, R., & Dahiya, R. (2020). Effect of ethical leadership and corporate social responsibility on firm performance: A systematic review. *Corporate Social Responsibility and Environmental Management*, *27*(2), 409–429.

San Cristóbal, José R, Carral, L., Diaz, E., Fraguela, J. A., & Iglesias, G. (2018). Complexity and project management: A general overview. *Complexity*, *2018*.

San Cristóbal, José Ramón. (2017). Complexity in Project Management. *Procedia Computer Science*, *121*, 762–766.

Saynisch, M. (2010). Beyond frontiers of traditional project management: An approach to evolutionary, self-organizational principles and the complexity theory—results of the research program. *Project Management Journal*, *41*(2), 21–37.

Scheepers, D., & Ellemers, N. (2019). Social identity theory. In *Social Psychology in Action* (pp. 129–143). Springer.

Schoper, Y.-G., Wald, A., Ingason, H. T., & Fridgeirsson, T. V. (2018). Projectification in Western economies: A comparative study of Germany, Norway and Iceland. *International Journal of Project Management*, *36*(1), 71–82.

Sears, S. K., Clough, R. H., & Sears, G. A. (2008). *Construction project management: a practical guide to field construction management*. John Wiley & Sons.

Sebestyen, Z. (2017). Further considerations in project success. *Procedia Engineering*, *196*, 571–577.

Senaratne, S., & Samaraweera, A. (2015). Construction project leadership across the team development process. *Built Environment Project and Asset Management*.

Sergeeva, N. (2017). Labeling projects as innovative: A social identity theory. *Project Management Journal*, *48*(1), 51–64.

Serra, C. E. M., & Kunc, M. (2015). Benefits realisation management and its influence on project success and on the execution of business strategies. *International Journal of Project Management*, *33*(1), 53–66.

Shaari, Z. H., Amar, A., Zainol, M. R., & Harun, A. B. (2015). Linking leadership studies to corporate brand management: a review. *International Journal of Business Administration*, *6*(1), 26.

Shah, R. K. (2016). An exploration of causes for delay and cost overrun in construction projects: A case study of Australia, Malaysia & Ghana. *Journal of Advanced College of Engineering and Management*, *2*(1), 41–55.

Shannahan, R. J., Bush, A. J., Moncrief, W. C., & Shannahan, K. L. J. (2013). Making sense of the customer's role in the personal selling process: A theory of organizing and sensemaking perspective. *Journal of Personal Selling & Sales Management*, *33*(3), 261–275.

Shao, J., Turner, R., & Müller, R. (2011). *A framework of program success*. IRNOP.

Sheffield, J., Sankaran, S., & Haslett, T. (2012). Systems thinking: Taming complexity in project management. *On the Horizon*.

Shenhar, A., & Holzmann, V. (2017). The three secrets of megaproject success: Clear strategic vision, total alignment, and adapting to complexity. *Project Management Journal*, *48*(6), 29–46.

Shenhar, A J, & Dvir, D. (2007). *Reinventing project management: The diamond approach to project management*. Boston, MA: Harvard Business School Press.

Shenhar, Aaron J. (2001). One size does not fit all projects: Exploring classical contingency domains. *Management Science*, *47*(3), 394–414.

Shenhar, A. J., Dvir, D., Lechler, T., & Poli, M. (2002). One size does not fit all: True for projects, true for frameworks. *Proceedings of PMI Research Conference*, 14–17.

Shi, H. (2020). The Influence of Safety-Specific Transformational Leadership and High-Quality Relationships on Mindful Safety Practices Through Safety Climate: A Study in Chinese Petroleum Industry. *Journal of Applied Security Research*, 1–17.

Shishodia, A., Dixit, V., & Verma, P. (2018). Project risk analysis based on project characteristics. *Benchmarking: An International Journal, (25), 893-918*.

Sicotte, H., & Bourgault, M. (2008). Dimensions of uncertainty and their moderating effect on new product development project performance. *R&d Management*, *38*(5), 468–479.

Smith, N. J., Merna, T., & Jobling, P. (2014). *Managing risk in construction projects*. John Wiley & Sons.

Snowden, D. J., & Boone, M. E. (2007). A leader's framework for decision making. *Harvard Business Review*, *85*(11), 68.

Sohmen, V. S. (2014). *Best Practices in Balancing Project Leadership and Project Teamwork*.27th IPMA World Congress, USA.

Sohmen, V. S. (2013). Leadership and teamwork: Two sides of the same coin. *Journal of IT and Economic Development*, *4*(2), 1–18.

Špundak, M. (2014). Mixed agile/traditional project management methodology–reality or illusion? *Procedia-Social and Behavioral Sciences*, *119*, 939–948.

Stets, J. E., & Burke, P. J. (2000). Identity theory and social identity theory. *Social Psychology Quarterly*, 224–237.

Stewart, J. (2006). Transformational leadership: An evolving concept examined through the works of Burns, Bass, Avolio, and Leithwood. *Canadian Journal of Educational Administration and Policy*, *54*.

Stingl, V., & Geraldi, J. (2017). Errors, lies and misunderstandings: Systematic review on behavioural decision making in projects. *International Journal of Project Management*, *35*(2), 121–135.

Strang, K. D. (2005). Examining effective and ineffective transformational project leadership. *Team*

Performance Management: An International Journal, *11*, 68–103. https://doi.org/10.1108/13527590510606299

Sulemana, I., & Kpienbaareh, D. (2018). An empirical examination of the relationship between income inequality and corruption in Africa. *Economic Analysis and Policy*, *60*, 27–42.

Sutcliffe, K. M. (2013). Sensemaking. *The Palgrave Encyclopedia of Strategic Management. Basingstoke: Palgrave Macmillan. Advance Online Publication. Retrieved from Http://Www. Palgraveconnect. Com/Pc/Doifinder/10.1057/9781137294678.0623*.

Tatikonda, M. V, & Rosenthal, S. R. (2000). Technology novelty, project complexity, and product development project execution success: a deeper look at task uncertainty in product innovation. *IEEE Transactions on Engineering Management*, *47*(1), 74–87.

Thamhain, H. J. (1999). Effective project leadership in complex self-directed team environments. *Proceedings of the Hawaii International Conference on System Sciences*, *00*(c), 274. https://doi.org/10.1109/hicss.1999.772968

Thiry, M. (2001). Sensemaking in value management practice. *International Journal of Project Management*, *19*(2), 71–77.

Thiry, M. (2002). Combining value and project management into an effective programme management model. *International Journal of Project Management*, *20*(3), 221–227.

Tidd, J., &Bodley, K. (2002). The ifnfluence of project novelty on the new product development process. *R &D Management*, *32*(2), 127–138.

Thomas, J. L. (2000). *Making sense of project management: Contingency and sensemaking in transitory organizations*. University of Alberta Edmonton.

Trepte, S., & Loy, L. S. (2017). Social Identity Theory and Self-Categorization Theory. *The International Encyclopedia of Media Effects*, *1*(1), 1–13.

Treviño, L. K., Brown, M., & Hartman, L. P. (2003). A qualitative investigation of perceived executive ethical leadership: Perceptions from inside and outside the executive suite. *Human Relations*, *56*(1), 5–37.

Trevino, L. K., Hartman, L. P., & Brown, M. (2000). Moral person and moral manager: How executives

develop a reputation for ethical leadership. *California Management Review*, *42*(4), 128–142.

Trivellas, P., & Drimoussis, C. (2013). Investigating leadership styles, behavioural and managerial competency profiles of successful project managers in Greece. *Procedia-Social and Behavioral Sciences*, *73*, 692–700.

Turner, J. C., & Tajfel, H. (1986). The social identity theory of intergroup behavior. *Psychology of Intergroup Relations*, *5*, 7–24.

Turner, J. R., & Müller, R. (2003). On the nature of the project as a temporary organization. *International Journal of Project Management*, *21*(1), 1–8.

Turner, J. R., Müller, R., & Dulewicz, V. (2009). Comparing the leadership styles of functional and project managers. *International Journal of Managing Projects in Business*.

Twumasi-Ampofo, K., Osei-Tutu, E., Decardi-Nelson, I., & Ofori, P. A. (2014). A model for reactivating abandoned public housing projects in Ghana. *Civil and Environmental Research*, *6*(3), 6–16.

Tyssen, A. K., Wald, A., & Spieth, P. (2014). The challenge of transactional and transformational leadership in projects. *International Journal of Project Management*, *32*(3), 365–375.

Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly*, *18*(4), 298–318.

UNESCO (2010). *Engineering: issues, challenges and opportunities for development*, UNESCO Report.

van den Ende, L., & van Marrewijk, A. (2014). The ritualization of transitions in the project life cycle: A study of transition rituals in construction projects. *International Journal of Project Management*, *32*(7), 1134–1145.

van der Hoorn, B., & Whitty, S. J. (2017). The project-space model: enhancing sensemaking. *International Journal of Managing Projects in Business, 15*(1), 185-202.

Vidal, L.-A., & Marle, F. (2008). Understanding project complexity: implications on project management. *Kybernetes*, *37*(8), 1094–1110.

Weaver, P. (2007). A simple view of complexity in project management. *World Project Management Week, Singapore. Retrieved on 19th February 2011from: Http://Www. Mosaicprojects. Com. Au/Resources_Papers_070. Html*.

Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly*, 628–652.

Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly*, 357–381.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (2005). Organizing and the process of sensemaking. *Organization Science*, *16*(4), 409–421.

Wen, Q., Qiang, M., & Gloor, P. (2018). Speeding up decision-making in project environment: The effects of decision makers' collaboration network dynamics. *International Journal of Project Management*, *36*(5), 819–831.

Whittington, R. (2010). Giddens, structuration theory and strategy as practice. *Cambridge Handbook of Strategy as Practice*, 109–126.

Wibowo, A. (2009). *The contribution of the construction industry to the economy of Indonesia: A systemic approach*.

Williams, E.N., & Morrow, S. L. (2009). Achieving trustworthiness in qualitative research: A pan-paradigmatic perspective. *Psychotherapy Research*, 19: 4-5, 576-582,DOI: 10.1080/10503300802702113.

Williams, T.M. (2002). *Modelling Complex Projects*. John Wiley & Sons, London.

Williams, T. M. (1999). The need for new paradigms for complex projects. *International Journal of Project Management*, *17*(5), 269–273.

Wood, H. & Ashton, P. (2009). *Factors of complexity in construction projects.* In: Dainty, A. (Ed) Procs 25th Annual ARCOM Conference, 7-9 September 2009, Nottingham, UK, Association of Researchers in Construction Management, 857-66.

Wood, H. L., & Gidado, K. (2008). *Project Complexity in Construction*. RICS Foundation, United Kingdom.

Wu, Y., Chau, K. W., Lu, W., Shen, L., Shuai, C., & Chen, J. (2018). Decoupling relationship between economic output and carbon emission in the Chinese construction industry. *Environmental*

Impact Assessment Review, *71*, 60–69.

Wuni, I. Y., & Shen, G. Q. (2020). Fuzzy modelling of the critical failure factors for modular integrated construction projects. *Journal of Cleaner Production*, *264*, 121595.

Wu, W. W., Eom, M. T., & Song, J. (2019). Spheres of It Project Complexity and It Project Manager Archetypes and Roles: A Case Study. *Information Systems Management*, *36*(4), 323–335.

Wu, Z., & Pagell, M. (2011). Balancing priorities: Decision-making in sustainable supply chain management. *Journal of Operations Management*, *29*(6), 577–590.

Xia, B., Olanipekun, A., Chen, Q., Xie, L., & Liu, Y. (2018). Conceptualising the state of the art of corporate social responsibility (CSR) in the construction industry and its nexus to sustainable development. *Journal of Cleaner Production*, *195*, 340–353.

Xu, A. J., Loi, R., & Ngo, H. (2016). Ethical leadership behavior and employee justice perceptions: The mediating role of trust in organization. *Journal of Business Ethics*, *134*(3), 493–504.

Yan, H., Elzarka, H., Gao, C., Zhang, F., & Tang, W. (2019). Critical success criteria for programs in China: Construction companies' perspectives. *Journal of Management in Engineering*, *35*(1), 4018048.

Yang, L.-R., Huang, C.-F., & Wu, K.-S. (2011). The association among project manager's leadership style, teamwork and project success. *International Journal of Project Management*, *29*(3), 258–267.

Yazdani, K., & Bashir, F. (2018). Impact of Transformational leadership on Project Success: Mediating role of Team-Building and Moderating Role of Human Resource Management Practices. *University of Wah Journal of Management Sciences*, 73.

Yizhong, X., Baranchenko, Y., Lin, Z., Lau, C. K., & Ma, J. (2019). The influences of transformational leadership on employee employability. *Employee Relations*.

Zaman, U., Nadeem, R. D., & Nawaz, S. (2020). Cross-country evidence on project portfolio success in the Asia-Pacific region: Role of CEO transformational leadership, portfolio governance and strategic innovation orientation. *Cogent Business & Management*, *7*(1), 1727681.

Zaman, U., Nawaz, S., Tariq, S., & Humayoun, A. A. (2019). Linking transformational leadership and "multi-dimensions" of project success: Moderating effects of project flexibility and project

visibility using PLS-SEM. *International Journal of Managing Projects in Business*, *13*(1), 103–127. https://doi.org/10.1108/IJMPB-10-2018-0210

Zhang, L., Cao, T., & Wang, Y. (2018). The mediation role of leadership styles in integrated project collaboration: An emotional intelligence perspective. *International Journal of Project Management*, *36*(2), 317–330. https://doi.org/10.1016/j.ijproman.2017.08.014

Zhang, L., & Cheng, J. (2015). Effect of knowledge leadership on knowledge sharing in engineering project design teams: the role of social capital. *Project Management Journal*, *46*(5), 111–124.

Zhu, J., & Mostafavi, A. (2017). Discovering complexity and emergent properties in project systems: A new approach to understanding project performance. *International Journal of Project Management*, *35*(1), 1–12.

Zhu, W., May, D. R., & Avolio, B. J. (2004). The impact of ethical leadership behavior on employee outcomes: The roles of psychological empowerment and authenticity. *Journal of Leadership & Organizational Studies*, *11*(1), 16–26.

Zuo, J., Zhao, X., Nguyen, Q. B. M., Ma, T., & Gao, S. (2018). Soft skills of construction project management professionals and project success factors: A structural equation model. *Engineering, Construction and Architectural Management*.

APPENDICES

Appendix A: Ethics Review Institutional or Organisational Request Letter

[Enter date]

Details of Addressee

Dear [Enter name / sir / madam]

Request to conduct research involving your organisation

This letter serves to confirm that *"Samuel Kwasi Dartey-Baah"* (Student ID: 22491651) is presently conducting research on The research title: *"The Relationship between Project Complexity and Project Success and the moderating effect of Project Leadership Styles and Roles in the Construction Industry of an Emerging Economy"*. This is part of his PhD research at the University of Stellenbosch.

Samuel is the Pricincipal Researcher with Prof Mias De Klerk being his Supervisor. The intended benefit of this research is to ascertain the meaning, understanding and practice of project complexity, specific to the Ghanaian construction industry. The research will add to literature by examining the moderating effects of project leadership styles and roles on the project complexity-project success relationships. The research will also serve as guidance for project managers and practitioners in the Ghanaian construction industry in ensuring project success. Further, it will provide policy makers as well as key actors in Ghana's construction industry with useful information in making decisions that support project leadership behaviours which would in turn boost the rate of successful project management in the Ghanaian construction industry.

Samuel would like to do the research within your organisation and therefore needs your permission to engage project leaders and project team members that have handled project(s) worth at least 200,000 US Dollars and also including information on the years of experience of the project leaders and team members.

The study will be conducted in an ethically sound and responsible manner and will consist engaging project leaders with over ten years experience in discussions on their understanding of project complexity in the Ghanaian construction industry, and delibrations on project roles. In addition, some project leaders and team members would be requested to complete questionnaires on project complexity, project success, project leadership and roles. For project leaders with ten years or more experience, some would be needed for a one day workshop on this work. Other project leaders and team members would also be required to complete an online questionnaire which will last for about 15 minutes. Furthermore, after the initial completion of the questionnaire and the quantitative analyses carried out by the researcher, there will be a follow up interview with selected participants for up to an hour to firm up understanding on the relationships between the study variables.

The research will be done for academic purposes. However, as the research is also deemed to provide useful insight for practice, the researcher will present a summary of the findings to your organisation. All information gathered will be treated as confidential and findings will be reported with the necessary discretion not to cause any harm to individuals and/or the organisation. The identity of your organisation will remain confidential throughout the research and in any future publications derived

University of Stellenbosch Business School
Address: PO Box 610 Bellville 7535 Carl Cronjé Drive Bellville 7530
Tel: +27 (0)21 918 4111 • Email: usbcom@usb.ac.za • Website: www.usb.ac.za

from it, unless there is explicit permission from you. The names of employees will remain confidential. Please feel free to suggest any additional restrictions you may deem necessary in respect of the research to protect the interests of the organisation. Your support is important for the research and it will be highly appreciated if you are willing to allow this research project in your organisation. Please advise whether you would regard the above arrangements as feasible. Please do not hesitate to contact the researcher [+233 20 962 1292, skdarteybaah@gmail.com] and/or the Supervisor Professor Mias de Klerk [Tel: +27 (0)21 918 4139, Mias.deKlerk@usb.ac.za] should you require any additional information regarding the above arrangements. We look forward to hearing from you and thank you for your kind consideration of this request.

Kind Regards

Prof Mias De Klerk
Supervisor

Appendix B: Quantitative Data Collection Instrument

Dear Participant,

I would hereby like to invite you to complete the attached questionnaire. The purpose of this survey is to examine aspects of project complexity, project success and project leadership styles and roles. This study is geared towards contributing to knowledge on the success of projects in the construction industry.

Please note that your participation is entirely voluntary, and you are free to decline to participate in this survey.

This study has been approved by the Stellenbosch University Ethics Committee and will be conducted according to accepted and applicable national and international ethics guideline and principles. The survey is anonymous and response data will only be analysed at aggregate level.

If you have any questions or concerns about this study, please feel free to contact Samuel Kwasi Dartey-Baah at skdarteybaah@gmail.com and +233 20 962 1292 or Professor Mias de Klerk [Tel: +27 (0)21 918 4139, Mias.deKlerk@usb.ac.za].

You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the University of Stellenbosch Division for Research Development.

If you are willing to participate and complete the questionnaire, please generate a seven-digit unique code following the ensuing procedure.

To ensure that those who took part in the development of the project leadership roles instrument are excluded from this main survey, you are requested to self-generate a unique code using the first letter of your first name and first letter of your last name (eg. "PA" for Paul Adams), the day of week you were born (eg. "S" for Sunday) and the day and month of birth (eg. "0305" for 3rd May) resulting in a seven-digit unique code. For the example given, the code would be **PAS0305.**

Please generate your unique code and indicate same in the box provided on the first page of the questionnaire. This survey is expected to take not more than 15 minutes to complete.

RIGHTS OF RESEARCH PARTICIPANTS: You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this study.

Best regards

Please provide the self-generated seven-digit unique code in the box below

SECTION A

This section gathers your personal information. Kindly respond to them by selecting the appropriate response.

1. Age: 20-30yrs [ ] 31-40yrs [ ] 41-50yrs [ ] 51-60yrs [ ] above 60yrs [ ]
2. Gender: Male [ ] Female [ ]
3. Highest academic qualification: SHS [ ] Diploma/HND [ ] Bachelors [ ] Masters [ ] Other [ ] Specify……
4. Number of years worked in the organization: less than 1 year [ ]; 1-10yrs [ ]; 11-20yrs [ ]; 21-30yrs [ ]; Above 30yrs [ ]
5. Value of largest project worked on (US Dollars): 200,000 – 1,000,000 [ ] 1,000,001 – 3,000,000 [ ] 3,000,001 – 5,000,000 [ ] 5,000,001 – 7,000,000 [ ] 7,000,001 – 9,000,000 [ ] Above 9,000,000 [ ]
6. Number of projects worked on: 1-5 [ ] 6-10 [ ] 11-15 [ ] 16-20 [ ] More than 20 [ ]
7. Role on projects: ……
8. Name of organization:……
9. Nature of Work: (eg. Civil Engineering, architecture, other [ ]Specify……
10. Please tick: Contractor [ ], Consultant [ ]; Other [ ] Specify……

SECTION B = PROJECT COMPLEXITY

The following statements measure certain characteristics of projects you have worked on. Use your experience from working on projects to respond to the statements. Please respond to each statement by ticking in the boxes the appropriate alternatives below the scales that best describes the level of difficulty.

Use the following scale: **1= Very Low, 2= Low, 3= Moderately Low, 4= Neutral, 5= Moderately High, 6= High, 7= Very High**

	1	2	3	4	5	6	7
Complexity by faith*							
1. When a project requires new methods and ideas that are not widely known, I encounter difficulties.							
2. The number of changes to the technical scope poses difficulties for me on a project.							
3. I encounter difficulties associated with the effect of technical changes on the project.							
4. I encounter difficulties associated with the effect of scope changes on the project.							
5. I experience complexities due to project uniqueness (eg. new client, new technology, etc.)							
Complexity by fact*							
6. The amount of information to be processed on a project poses difficulties for me							
7. The number of people and organisations involved on a project poses difficulties for me							
8. I encounter complexities as a result of interdependency of technology, people and organisations on a project							
9. The characteristics of the project such as size pose difficulties							
Complexity by interaction*							
10. Depending on the level of locality or internationality							
11. The multidisciplinary level and nature of a project poses difficulties							

12. The degree of transparency of information required on a project, results in complexities for me							
13. I encounter difficulties as a result of empathy with the various stakeholders on a project							

SECTION C = PROJECT SUCCESS

This section measures the outcomes of projects that you have worked on. Please use your experience from working on projects to respond by selecting the most appropriate option for each statement. Use the following scale:

1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree

Items	**1**	**2**	**3**	**4**	**5**
Project Efficiency (1)*					
1. Projects were completed on time or earlier					
2. Projects were completed within or below budget					
3. Projects had only minor changes					
4. Other efficiency measures were achieved					
Impact on customer/user (2)*					
5. Projects improved the customer's performance					
6. The customers were satisfied					
7. The products met the customers' requirements					
8. The customers are using the project					
9. The customers will come back for future work					
Impact on the Team (3)*					
10. The project teams were highly satisfied and motivated					
11. The teams were highly loyal to the projects					
12. The project teams had high morale and energy					
13. The teams felt that working on the projects was fun					
14. Team members experienced personal growth					
15. Team members wanted to stay in the organization					
	1	**2**	**3**	**4**	**5**

Business and Direct organisational success (4)*					
16. The projects were economic business successes					
17. The projects increased the organization's profitability					
18. The projects have positive returns on investment					
19. The projects increased the organization's market share					
20. The projects contributed to shareholders' value					
21. The projects contributed to the organization's direct performance					
Preparing for the future (5)*					
22. The project outcomes will contribute to future projects					
23. The projects will lead to additional new products					
24. The projects will help create new markets					
25. The projects created new technologies for future use					
26. The projects contributed to new business processes					
27. The projects developed better managerial capabilities					

SECTION D = TRANSFORMATIONAL & TRANSACTIONAL LEADERSHIP STYLES

The following statements describe certain behaviours of project leaders. Please use your current experience to respond to the following statements about your project leader. If you are currently a project leader yourself, you can use your past experience as a team member to rate your past project leaders. Please respond to each statement by ticking in the boxes the appropriate alternatives below the scales that best describes your leader. Use the following scale:

1= Not at all, 2= Once in a while, 3= Sometimes, 4= Fairly often, 5= Frequently, if not always.

My Project leader	**1**	**2**	**3**	**4**	**5**
Transformational Leadership*					
1. Instils pride in me for being associated with him/her					
2. Goes beyond self-interest for the good of the group					
	1	**2**	**3**	**4**	**5**

3. Acts in ways that build my respect					
4. Displays a sense of power and confidence					
5. Talks about his/her most important values and beliefs					
6. Specifies the importance of having a strong sense of decisions					
7. Emphasizes the importance of having a collective sense of mission					
8. Talks optimistically about the future					
9. Talks enthusiastically about what					
10. Expresses a compelling vision of the Future					
11. Expresses confidence that goals will be achieved					
12. Re-examines critical assumptions to questions whether they are appropriate or not					
13. Seeks differing perspectives when solving problems					
14. Gets me to look at problems from many different angles 15. Suggests new ways of looking at how to complete assignments					
16. Spends time teaching and coaching					
17. Treats me as individual rather than just a member of team					
18. Considers me as having different needs, abilities and aspirations from others					
19. Helps me to develop strengths					
Transactional leadership*					
20. Provides me with assistance in exchange for my efforts					
21. Discusses in specific terms who is responsible for achieving performance targets					
22. Makes clear what I can expect to receive when performance goals are achieved					
23. Expresses satisfaction when I meet expectations					
24. Focuses attention on irregularities, mistakes, exceptions and deviations from standards					

25. Concentrates his/her full attention on dealing with mistakes, complaints					
26. Keeps track of all mistakes					
27. Directs my attention toward failures to meet Standards					
28. Fails to interfere until problems become serious					
29. Waits for things to go wrong before					
30. Shows that he/she is a firm believer in "if it will not break, don't fix it"					
31. Demonstrates that problems must become chronic before taking action					

SECTION E = ETHICAL LEADERSHIP

The following statements also describe certain qualities of your project leader. Please use your current experience to respond to the following statements about your project leader. If you are currently a project leader yourself, you can use your past experience as a team member to rate your past project leaders. Please respond to each statement by ticking in the boxes the appropriate alternatives below the scales that best describes your leader.

Use the following scale:

1= Highly unlikely, 2= Unlikely, 3= Slightly unlikely, 4= Neutral, 5= Slightly likely, 6= Likely, 7= Highly likely

My Project Leader:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Conducts his/her personal life in an ethical manner							
2. Defines success not just by results but also the way that they are obtained							
3. Listens to what employees have to say							
4. Disciplines employees who violate ethical standards							
5. Makes fair and balanced decisions							
6. Can be trusted							
	1	**2**	**3**	**4**	**5**	**6**	**7**

7. Discusses business ethics or values with employees							
8. Sets an example of how to do things the right way in terms of ethics							
9. Has the best interests of employees in mind							
10. When making decisions, asks "what is the right thing to do?"							

SECTION F = PROJECT LEADERSHIP ROLES

The following statements illustrate the extent to which your project leader is likely or unlikely to perform certain leadership roles on the project. Please respond to each statement by ticking in the boxes the appropriate alternatives below the scale that best describes your leader.

Use the following scale:

Scale: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree

Items	**1**	**2**	**3**	**4**	**5**
Integrator					
1. My project leader has good interpersonal skills					
2. My project leader has good technical skills					
3. My project leader is sensitive					
4. My project leader has diagnostic skills					
5. My project leader displays wisdom					
6. My project leader resolves conflicts					
7. My project leader collaborates to strong relationships					
8. My project leader adopts a two-way communication with the members					
9. My project leader establishes various channels of interactions					
10. My project leader mediates to facilitate aspects of foreign culture					
11. My project leader negotiates, builds to maintain agreement among those on the projects					
Energiser and Mobiliser*	**1**	**2**	**3**	**4**	**5**
12. My project leader is optimistic					

13. My project leader is energetic					
14. My project leader is often excited about projects					
15. My project leader is persuasive					
16. My project leader is actively involved in the project					
17. My project leader creates confidence					
18. My project leader encourages team members in decision-making					
19. My project leader promotes discussions					
Compassionate Anchor*					
20. My project leader is caring					
21. My project leader is empathetic					
22. My project leader is understanding					
23. My project leader is supportive					
24. My project leader offers praise to members					
25. My project leader gives adequate and timely feedback					
Direction setter*					
26. My project leader is a visionary					
27. My project leader inspires me					
28. My project leader engages me					
29. My project leader is focused					
30. My project leader is committed					
31. My project leader sets goals for the team					
32. My project leader is able to lead people from diverse backgrounds					
Goal orchestrator*					
33. My project leader is results driven					
34. My project leader is a diligent monitor					
35. My project leader is fully-informed					
36. My project leader is an advisor					
37. My project leader provides adequate structures					
38. My project leader gives clear task direction					
39. My project leader observes and inquires where necessary					
Ethical tone-setter*	**1**	**2**	**3**	**4**	**5**

40. My project leader is a role model					
41. My project leader is morally upright					
42. My project leader is honest					
Catalyst of possibilities*					
43. My project leader is creative					
44. My project leader is dynamic					
45. My project leader is flexible					
46. My project leader has good technical skills					
47. My project leader is proactive					

*Please note that the dimensions were not explicitly labelled during data collection as done in this attachment

Appendix C: Final Qualitative Questions

Question 1: Determine how the conceptualised complexity by faith relates to project success.

The study findings showed that the more projects are complex, the more it results in poor project outcomes. However, contrary to expectations, complexity that involves the process of creating "something unique or solving new problems did not necessarily have significant influence on project success. What do you think may account for these findings?

Question 2: Determine how the contextualised complexity by fact relates to project success.

The study findings showed that project complexity which involves having to deal with large volumes of data and activities influence project success in a negative way, leading to poor project outcomes. What in your experience may account for these findings? In other words, how does a requirement of dealing with large volumes of data and activities influence project success?

Question 3: Determine how the contextualised complexity by interaction relates to project success.

The study findings showed that an aspect of project complexity that arises from interacting with people and organisational structures tend to contribute to poor project outcomes. In your experience, how and why do a requirement of substantial interaction with people and organizational structures influence project success?

Question 4: Determine the relationship between project leadership style (transformational leadership) and project success.

The study found that leaders who provide vision, guidance and intellectually stimulate project teams (transformational leadership), enhance project teams' capacity, leading to successful project outcomes. From your experience what do you think accounts for this?

Question 5: Determine the relationship between project leadership style (ethical leadership) and project success.

The study found from the study that when project leaders are seen to be ethical, demonstrating moral uprightness, fairness and are transparent (ethical leadership), it influences project teams positively to work towards successful project outcomes. From your experience what do you think accounts for this?

Question 6: Determine the relationship between project leadership style (transactional leadership) and project success.

The study found that when project leaders primarily concentrate on tasks and the use of exchanges and bargains (transactional leadership) to influence followers towards project goals and achieving objectives, it did not have significant influence on project success outcomes. What in your view may account for this?

Question 7: Ascertain the moderating effect of project leadership roles on the relationship between project complexity and project success.

The study found that project leaders' roles (such as being visionary, ethical, innovative, compassionate, knowledgeable, and having good relational skills) improve the relationship between project complexity and project success outcomes. From your experience what do you think accounts for this?

It was however found that project leaders who demonstrates optimism and enthusiasm about the work do not necessarily improve the relationship between project complexity and project success outcomes? What do you think may account for this finding?

Question 8: Determine how the contextualised project complexity relates to project success.

The study findings showed that the more complex projects become, the lower the project success are likely to be. What in your view account for this?

Appendix D: Ethics Review Informed Consent Template

D1: Ethics Review Informed Consent Template – Project Complexity

CONSENT TO PARTICIPATE IN RESEARCH (APPENDIX B1)

Title of research project	:	**The Relationship Between Project Complexity and Project Success and the Moderating Effect of Project Leadership Styles and Roles in the Construction Industry of an Emerging Economy**
Researcher	:	**Samuel Kwasi Dartey-Baah**
Research supervisor	:	**Prof Mias De Klerk**
Department	:	**University of Stellenbosch Business School**
Qualification	:	**PhD**

You are requested to participate in this part of the research study. You were selected as a possible participant in this study because of your research experience in project management/leadership or your practical expertise in project management/leadership in the Ghanaian construction industry.

1. Purpose and benefits of the study

This exercise seeks to ascertain the meaning and understanding of the concept of project complexity and its dimensions within the Ghanaian construction industry. This exercise will use an existing project complexity scale as a guide. Each statement will be deliberated and discussed to assess its relevance and practicality in the industry. You will be requested to make your understanding and final recommendations known.

2. Procedures

Should you volunteer to participate in this study, we would request the following from you:
1. This exercise will entail discussions and deliberations amongst your fellow expert researchers and practitioners, yourself included.
2. This exercise in totality is expected to take a maximum of half a day to complete.
3. It is expected to take a maximum of 3.5 hours including a 30-minute tea break after three half hours.
4. This exercise will be completed at the University of Ghana.
5. Adequate logistics such as office space for meeting, stationery, etc. will be provided for the entirety of the exercise.
6. Transportation costs up to 20 USD will be paid to each participant after the exercise.
7. There will be no reference to your identity as a person. Responses that you give will not and cannot be used to identify you.
8. You are at liberty to withdraw from participating in this exercise at any point.
9. Should you choose to withdraw at any point in this exercise, it will not affect you in any way and any related data captured will be destroyed/erased completely.
10. You will be requested to reach consensus on your views and opinions amongst yourselves as colleagues, and these submissions will be discussed and finalised briefly with the researcher.

3. Potential risks and discomforts

This study does not pose any reasonably foreseeable physical or psychological risks with regard to participation.

4. Confidentiality and protection of participants

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of not requiring your personal information such as name which may be

used to identify you. The information will solely be used for educational and academic purposes only. Your identity as a participant will not be revealed when this study is being published in an academic scholarly journal.

5. Payment for participation

There will be no payment to you as an expert for your participation in this study.

6. Participation and withdrawal

You can choose whether to contribute to this study or not. If you volunteer to contribute to this study, you may withdraw at any time without consequences of any kind. The researcher may withdraw you from this research if circumstances arise which warrant doing so. Please note that your decision to participate or otherwise reflects your personal capacity related to your research and practical expertise in project management and project leadership, and therefore you do not represent your organisation(s) in this study.

7. Contact detail

If you have any questions or concerns about the research, please feel free to contact the researcher [+233 20 962 1292, skdarteybaah@gmail.com] and/or the Supervisor Professor Mias de Klerk [Tel: +27 (0)21 918 4139, Mias.deKlerk@usb.ac.za].

8. Rights of research subjects

Should you decide to withdraw your consent at any time and discontinue participation, you do this without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the University of Stellenbosch Division for Research Development.

DECLARATION AND SIGNATURE OF RESEARCH SUBJECT

The information above was explained to me by Samuel Kwasi Dartey-Baah in clear terms. I was given the opportunity to ask questions and these questions were answered to *my* satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Name of subject or participant: _____

Signature: _____ **Date:** _____

DECLARATION AND SIGNATURE OF RESEARCHER

I declare that I explained the information provided in this document to _____ [*name of the subject/participant]. [He*/she] was encouraged, and given ample time, to ask me any questions.

Signature: _____ **Date:** _____

[Please note: if the research subject is not entirely conversant in English and explanation has to be given in another language, the above declarations should give appropriate details. Similarly, should the participant be represented by someone else in the consent process, the declarations have to be adapted accordingly.

D2: Ethics Review Informed Consent Template – Leadership Roles

CONSENT TO PARTICIPATE IN RESEARCH (APPENDIX B2)

Title of research project	:	**The Relationship Between Project Complexity and Project Success and the Moderating Effect of Project Leadership Styles and Roles in the Construction Industry of an Emerging Economy**
Researcher	:	**Samuel Kwasi Dartey-Baah**
Research supervisor	:	**Prof Mias De Klerk**
Department	:	**University of Stellenbosch Business School**
Qualification	:	**PhD**

You are requested to participate in this part of the research study. You were selected as a possible participant in this study because of your research experience in project management/leadership or your practical expertise in project management/leadership in the Ghanaian construction industry.

1. Purpose and benefits of the study

This exercise seeks to ascertain the validity (face and content) of a project leadership roles measure that has been prepared by the researcher. This is important to ascertain the relevance and significance for each statement in measuring project leadership roles within the Ghanaian construction industry. Each statement will be deliberated and discussed to assess its relevance and practicality in the industry as well as its clarity of presentation. You will be requested to make your consensus and final recommendations of the measure known.

2. Procedures

Should you volunteer to participate in this study, we would request the following from you:
1. This exercise will entail discussions and deliberations amongst your fellow expert researchers and practitioners, yourself included.
2.This exercise in totality is expected to take a maximum of half a day to complete.
3. It is expected to take a maximum of 4 hours with a 30-minute tea break after two and half hours and thereafter reconvene for about another hour after which lunch will be served.
4. This exercise will be completed at the University of Ghana.
5. Adequate logistics such as office space for meeting, stationery, etc. will be provided for the entirety of the exercise.
6. Transportation costs up to 20 USD will be paid to each participant after the exercise.
7. There will be no reference to your identity as a person. Responses that you give will not and cannot be used to identify you.
8. You are at liberty to withdraw from participating in this exercise at any point.
9. Should you choose to withdraw at any point from this exercise, it will not affect you in any way and any related data captured will be destroyed/erased completely.
10. You will be requested to reach consensus on your views and opinions amongst yourselves as colleagues, and these submissions will be discussed and finalised briefly with the researcher.

3. Potential risks and discomforts

This study does not pose any reasonably foreseeable physical or psychological risks with regard to participation.

4. Confidentiality and protection of participants

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of not requiring your personal information such as name which may be used to identify you. The information will solely be used for educational and academic purposes only. Your identity as a participant will not be revealed when this study is being published in an academic scholarly journal.

5. Payment for participation

There will be no payment to you as an expert for your participation in this study.

6. Participation and withdrawal

You can choose whether to contribute to this study or not. If you volunteer to contribute to this study, you may withdraw at any time without consequences of any kind. The researcher may withdraw you from this research if circumstances arise which warrant doing so. Please note that your decision to participate or otherwise reflects your personal capacity related to your research and practical expertise in project management and project leadership, and therefore you do not represent your organisation(s) in this study.

7. Contact detail

If you have any questions or concerns about the research, please feel free to contact the researcher [+233 20 962 1292, skdarteybaah@gmail.com] and/or the Supervisor Professor Mias de Klerk [Tel: +27 (0)21 918 4139, Mias.deKlerk@usb.ac.za].

8. Rights of research subjects

Should you decide to withdraw your consent at any time and discontinue participation, you do this without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the University of Stellenbosch Division for Research Development.

DECLARATION AND SIGNATURE OF RESEARCH SUBJECT

The information above was explained to me by Samuel Kwasi Dartey-Baah in clear terms. I was given the opportunity to ask questions and these questions were answered to *my* satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Name of subject or participant: _____

Signature: _____ **Date:** _____

DECLARATION AND SIGNATURE OF RESEARCHER

I declare that I explained the information provided in this document to _____ [*name of the subject/participant]. [He*/she] was encouraged, and given ample time, to ask me any questions.

Signature: _____ **Date:** _____

[Please note: if the research subject is not entirely conversant in English and explanation has to be given in another language, the above declarations should give appropriate details. Similarly, should the participant be represented by someone else in the consent process, the declarations have to be adapted accordingly.

D3: Ethics Review Informed Consent Template – Final Qualitative Work

CONSENT TO PARTICIPATE IN RESEARCH (APPENDIX B3)

Title of research project	:	**The Relationship between Project Complexity and Project Success and the Moderating Effect of Project Leadership Styles and Roles in the Construction Industry of an Emerging Economy**
Researcher	:	**Samuel Kwasi Dartey-Baah**
Research supervisor	:	**Prof Mias De Klerk**
Department	:	**University of Stellenbosch Business School**
Qualification	:	**PhD**

You are requested to participate in this part of the research study. You were selected as a possible participant in this study because you work as a project leader or project team member on projects in the Ghanaian construction industry and you participated in the earlier survey of this research.

1. Purpose and benefits of the study

This study seeks to unearth the underlying reasons for the quantitative findings on the interrelationships among project complexity, project success, project leadership styles and roles within the Ghanaian construction industry. This is important to ascertain the understanding of these findings from the earlier survey on how the concepts interact within this industry towards generating more knowledge on increasing success in construction projects.

2. Procedures

Should you volunteer to participate in this study, we would request the following from you:
1. This exercise will entail a face-to-face interview or conversation with the researcher.
2. The exercise in totality is expected to take an hour to complete.
3. This exercise will be completed at your convenience in your organisation.
4. Permission is requested to record your responses.
5. Should you give the permission to record, you will not be required to give any personal information that can be used to identify you as a person.
6. There will be no reference to your identity as a person. Responses that you give will not and cannot be used to identify you.
7. You are at liberty to withdraw from participating in this exercise at any point.
8. Should you choose to withdraw at any point in this exercise, it will not affect you in any way and any related data captured will be destroyed/erased completely.

3. Potential risks and discomforts

This study does not pose any reasonably foreseeable physical or psychological risks with regard to participation.

4. Confidentiality and protection of participants

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of not requiring your personal information such as name which may be used to identify you. Recorded responses will be handled, transcribed and stored only by the researcher on a password control laptop and will be kept confidential. The recordings, should you permit, will only be in audio format and not video. You are at liberty to review your responses recorded after the interview. You will also have access to the audio recording of your interview. The recordings will be

erased after they have been transcribed, cross-checked and reviewed by the researcher(s) as well as the participants. The information will solely be used for educational and academic purposes only. Your identity as a participant will not be revealed when this study is being published in an academic scholarly journal.

5. Payment for participation

There will be no payment to you as an expert for your participation in this study.

6. Participation and withdrawal

You can choose whether to contribute to this study or not. If you volunteer to contribute to this study, you may withdraw at any time without consequences of any kind. The researcher may withdraw you from this research if circumstances arise which warrant doing so. Please note that your decision to participate or otherwise reflects your personal capacity related to your experience and/or expertise in project management and project leadership, and therefore you do not represent your organisation(s) in this study.

7. Contact detail

If you have any questions or concerns about the research, please feel free to contact the researcher [+233 20 962 1292, skdarteybaah@gmail.com] and/or the Supervisor Professor Mias de Klerk [Tel: +27 (0)21 918 4139, Mias.deKlerk@usb.ac.za].

8. Rights of research subjects

Should you decide to withdraw your consent at any time and discontinue participation, you do this without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché [mfouche@sun.ac.za; 021 808 4622] at the University of Stellenbosch Division for Research Development.

DECLARATION AND SIGNATURE OF RESEARCH SUBJECT

The information above was explained to me by Samuel Kwasi Dartey-Baah in clear terms. I was given the opportunity to ask questions and these questions were answered to *my* satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Name of subject or participant: _____

Signature: _____ **Date:** _____

DECLARATION AND SIGNATURE OF RESEARCHER

I declare that I explained the information provided in this document to _____ [*name of the subject/participant]. [He*/she] was encouraged, and given ample time, to ask me any questions.

Signature: _____ **Date:** _____

[Please note: if the research subject is not entirely conversant in English and explanation has to be given in another language, the above declarations should give appropriate details. Similarly, should the participant be represented by someone else in the consent process, the declarations have to be adapted accordingly.