



NOVA

University of Newcastle Research Online

nova.newcastle.edu.au

Mwelu, Noah; Davis, Peter R.; Ke, Yongjian; Watundu, Susan & Jeffries, Marcus.
"Success factors for implementing Uganda's public road construction projects"
Published in the *International Journal of Construction Management*, (2019).

Available from: <https://doi.org/10.1080/15623599.2019.1573481>

This is an Accepted Manuscript of an article published by Taylor & Francis in the
International Journal of Construction Management on 21/03/2019, available online:
<https://doi.org/10.1080/15623599.2019.1573481>.

Accessed from: <http://hdl.handle.net/1959.13/1414001>

Success Factors for Implementing Uganda's Public Road Construction Projects

Noah Mwelu^{1}, Peter R. Davis², Yongjian Ke³, Susan Watundu⁴, Marcus Jefferies⁵*

^{1,2&5}School of Architecture and Built Environment, University of Newcastle, Callaghan, NSW 2308, Australia

³School of Built Environment, University of Technology Sydney, Ultimo, NSW 2007, Australia.

⁴Department of Management Science, Makerere University Business School, Plot 21A Port Bell road, Kampala, Uganda.

*Corresponding author ¹*Email: noahmwelu@yahoo.com,*

**Noah Mwelu is a PhD (Building) Student in Public Procurement in the School of Architecture and Built Environment, The University of Newcastle (UoN), NSW, Australia. He is a Researcher and Consultant in Public Procurement. He holds a Master and Bachelor of Procurement and Supply Chain Management. His current research interests are in the areas of Public Procurement, Supply Chain Management, and Logistics and Distribution Management. Dr Davis is Prof of Construction Management at the University of Newcastle (UoN), NSW, Australia. In a long academic career spanning 26-years Davis has managed several funded research projects and was awarded 2 Industry Engagement Professional Excellence in Building Awards from the Australian Institute of Building (AIB) for general research and academic projects. To date, Davis has produced over 138 publications and managed several funded research initiatives, for example CRC-CI, together with working on 10 significant grants. Grant income in the last 4 years is AU\$451,000. Davis' publications have yielded a cumulative total of 1101 citations since 2013 and his h-index is 22 (Google Scholar, 2018). Dr Yongjian Ke, is a Senior Lecturer in Project Management in the School of Built Environment, University of Technology Sydney, NSW, Australia. His current research interests include Risk Management, Procurement Management and Relationship Management in Mega Projects. Dr Susan Watundu is a Senior Lecturer in Quantitative Economics, Econometrics and Management Sciences in Makerere University Business School, Kampala, Uganda. She hold a PhD in Economics, Master and Bachelor of Science in Quantitative Economics. Her current research interests are in the areas of Transport and Energy Economics, Agriculture and Community livelihoods.*

Success Factors for Implementing Uganda's Public Road Construction Projects

Abstract The construction industry is known for its underperformance. Globally, construction projects are often delayed and completed above estimated budgets because of inferior works and contract variations. These in turn negatively affect the goals set by public sector client. Many studies aim to establish factors for successful construction projects that include public road construction projects. However, challenges remain. Using institutional theory, this research focusses on success factors for implementing public road construction projects in Uganda. Loss of funds in such projects significantly affects and stalls the implementation process. This study is cross-sectional and structured self-administered questionnaires are used with Partial Least Square Structural Equation Modeling (PLS-SEM) data analysis by Smart-PLS3 subsequently conducted. The findings reveal that professionalism; monitoring activities; familiarity with regulatory framework; perceived inefficiency of regulatory framework and compliance with these frameworks significantly enhances successful implementation of public road construction projects. However, sanctions on staff and contractors' resistance to non-compliance are insignificant predictors. Governments globally should emphasize and embark on improving monitoring mechanisms and staff familiarity with public procurement regulatory frameworks to avoid manipulations by unethical project stakeholders especially on contract cost variation during implementation. These regulatory frameworks should be written in a less technical language that is easily interpreted by stakeholders. Recruitment of qualified staff is paramount.

Keywords: Compliance, Project success, Public road construction, Regulatory framework.

Introduction

The construction industry is known for its underperformance, characterized by cost and schedule overruns, with substandard works that has resulted in significant building defects. Continuous underperformance has also been cited in public road construction projects (Kakitahi, Landin, & Alinaitwe, 2013; Love, Dominic, & Zahir Irani, 2016). Common challenges facing the construction industry include: construction cost

variations; delayed project completion; and shoddy work arising from mistrust among construction stakeholders (Ntayi, Rooks, Eyaa, & Qian, 2010). Globally, the construction industry loses around US\$340 billion annually due to fraudulent practices (Sohail & Cavill, 2008). For successful road construction projects, cost overruns should be avoided to enhance the performance of public sector (Odeck, 2004). Such a strategy would enable the public sector to achieve its objectives. For example, cost and time overruns in Sydney's cross city tunnel, Brisbane's river city motorway and Sydney's M7 Clem Jones tunnel affected Australian Government objectives (Love, Dominic, et al., 2016). These similar challenges affect construction projects in Nigeria according to Zadawa, Hussin, and Osmadi (2018), the Gaza Strip (Tayeh, Al Hallaq, Alaloul, & Kuhail, 2018), United Kingdom (UK) (Gledson, Williams, & Littlemore, 2018), Ghana (Ameyaw et al., 2017) and Kenya (Ngacho & Das, 2014).

Uganda a developing country, economically depends on public road construction subsector like other countries. This is a consequence of the fact that Uganda's road sector is a core mode of transport and accounts for 90% of cargo freight and passengers (Ministry of Works and Transport, 2014). However, in line with other countries the Ugandan subsector is characterized with unsatisfactory performance. Furneaux et al. (2006) and Atkinson (1999), suggest that satisfactory contract performance is realized when the project meets client/government objectives and that the goals align with public expectations of project quality, cost and timely delivery. Late project delivery and cost overruns are partly attributed to non-compliance. Author's note issues that include, ambiguous national construction standards and ineffective governance structures that affect successful project implementation (White & Fortune, 2002). In addition, increasing cases of public road construction procurement irregularities account for a US\$258.6 million loss annually (Agaba & Shipman, 2007). In a Ugandan context, Kanoni-Ssembabule-Villa Maria (120KM roadway) and Hima-Katunguru (58KM roadway) construction projects were investigated due to implementation irregularities in the order of Ushs.322 billion or US\$.87.278 million (New Vision, 20th October 2016). Such large value project failures cost Governments and retard economic growth on a national scale. Some studies have established success factors for implementing construction

projects (Atkinson, 1999; Lam, Chan, & Chan, 2008; Langston, 2014; Love, Smith, Simpson, Regan, & Olatunji, 2015; Walker & Lloyd-Walker, 2015), however, less attention is placed on public road construction subsector. Studies focusing on the public road construction subsector have hinged on limited indicators (Love, Dominic, et al., 2016; White & Fortune, 2002). Hence, this study considered public roads because of the uniqueness and complexity in operations of this subsector that requires a more elaborate study involving anticipated success factors from alternative perspectives. In particular, Uganda's public road construction projects were selected because of numerous reports surrounding unsuccessful implementation of these projects. Considering successful public road construction subsector is important since the subsector is economically dependant on world economies (Munyasya & Chileshe, 2018). Using data from Uganda's public road construction projects, this study aims to identify success factors for implementing public road construction projects from the perspective of institutional theory. Institutional theory is vibrant in formulating knowledge (Boer, Matthias, Martin, & Roger 2014). Institutional theory as a framework to review project success factors in road construction projects is discussed in the next section.

Institutional Theory: A Framework to Review Project Success Factors in Road Construction Projects

Although there are many theories adopted by scholars for undertaking their respective research projects. Institutional theory is widely applied in diverse fields to advance research objectives and identify critical research factors (Bruton, Ahlstrom, & Li, 2010; DiMaggio & Powell, 1991). Institutions are formerly designed to control human interactions. They comprise laws, regulations, conventions and norms enforced by respective organizations to achieve their desired objectives. Among the key formal institutional mechanisms in guiding and meeting organizational objectives are monitoring

and enforcement (North, 1993, 2016). In addition, Institutional theory comprises cultural cognitive, regulatory and normative elements (Scott, 2005). Regulatory element deals with rules, laws and sanctions as enforcement mechanisms. These are required for implementing road construction projects. Regulatory dimension help enforce legally binding contracts signed between parties for example Government and contractors for construction of public road construction project (Geels, 2004). Governments through the legal powers use sanctions and monitoring strategies to influence employees' compliance with regulatory framework.

Successful organizational performance is based on compliance with its norms and the rate of employees deviating from such norms negatively impacts their effectiveness. Compliance with institutional norms is called institutional fit (Oliver, 1991). Deviations in road construction projects results in undesired outcomes. Such deviations can be readily identified if organizational norms are effective and supported by strong sanctions capable of correcting deviant behavior (North, 2016; Oliver, 1991). In Ugandan public road construction projects, stakeholders are expected to comply with established public procurement regulatory frameworks that govern them. However, compliance with institutional norms and regulatory framework is resisted by some stakeholders who may find alternative means of successfully accomplishing tasks within their knowledge and pecuniary interest (Greenwood & Hinings, 1996; Kondra & Hinings, 1998). This may lead to contractors resisting bad decisions made by public officers in order to successfully implement public road construction projects. North (2016) notes that enforcing professional code and sanctions face retaliations. An efficient regulatory framework together with effective enforcement mechanism would constrain deviant stakeholders and consequently lead to successful project implementation.

Cultural cognition deals with symbols, beliefs and a common understanding that defines individual behavior (Scott, 2013). Cultural cognition can provide a perspective as to how a public road construction project team would perceive project activities and objectives in order to do what they see as the right thing. Normative elements are concerned with professionalism and deals with norms and values that form a set of rules by which a road construction team must comply (DiMaggio & Powell, 2015; Scott, 2013). Professionalism is a combined effort by a group of members with professional behavior striving for better work methods and conditions for prosperity. This can be enabled through formal university education, legitimate skills and professional networking necessary in implementing road construction projects (DiMaggio & Powell, 2015).

A firm's successful performance depends on effective enforcement, staff skills and knowledge to achieve organizational objectives (North, 1993). Investing in road construction staff competence by improving their skills and knowledge coupled with a professional code is of paramount importance for project success. Relatedly, workforce diversity and structural differentiations are drivers of successful organizational performance (Greenwood & Hinings, 1996). Noteworthy diverse public road construction stakeholders individually seek high performance. They largely seek to accomplish this via their perceived individual obligations. They tend to resist others that do not comply. Many studies have been conducted to determine success factors in the construction industry. However, few studies adopt a theoretical lens to determine such factors. This study adopts institutional theory because a theoretical approach is paramount in undertaking research and can help to explain success factors for implementing public road construction projects (Geels, 2004; Scott, 1995).

Literature Review and Hypotheses Development

Institutional theory suggests that implementing public road construction projects successfully; depends on regulatory efficiency, professionalism, familiarity, compliance with governing regulatory framework, monitoring activities, sanctions and contractors' resistance. Attempts by scholars to establish success factors in the construction industry. However, these factors were general in nature, they paid little attention to particular success factors required to implement public road construction projects (Langston, 2014; Love, Dominic, et al., 2016). More particularly, none on these studies considered Uganda's public road construction projects. Thus, this study fills the gap using institutional theory to identify success factors that would be helpful in implementing Uganda's public road construction projects.

Interestingly, project success is achieved if the client is satisfied (Dvir & Lechler, 2004; Furneaux et al., 2006). Satisfaction determines construction project success (Lam et al., 2008; Walker & Lloyd-Walker, 2015). This study considers Government satisfaction measured through time, cost and project specifications to determine successful implementation of public road construction projects (Dvir & Lechler, 2004). These are iron triangle indicators measuring construction project success (Atkinson, 1999). The following subsections present specific literature on success factors derived from institutional theory. The factors are listed and supported in Table 1 below.

(Insert Table 1 here)

Compliance with Public Procurement Regulatory Framework

A procurement performance reviews help to identify project success/failure based on scope of works and its contract compliance. Similarly, these reviews are necessary in road construction where inspections and audits are used to determine compliance (Snyder,

2013). Compliance with a regulatory framework is significant factor in determining construction project success according to (Tabish & Jha, 2011). For example, Ford suggests that stakeholders were dissatisfied with project cost and schedule overruns affecting 30% of roads and bridges as a consequence of low compliance levels (Ford, 2011). This dissatisfaction is complicated by mistrust amongst contractors fearing competition and their non-compliance with construction standards that may lead to building collapse (Ntayi et al., 2010). Furthermore, a lack of compliance with quality requirements significantly contributes to reworks in construction projects (Love, Gunasekaran, & Li, 1998). Rework measures the corrections that are required and caused by non-compliance with required standards (Love, 2002; Love, Ackermann, Teo, & Morrison, 2015). A project is successfully delivered when it complies with specifications, contract terms and conditions. All these studies suggest that eliminating non-compliance in public road construction projects would help successful meet Government goals aligned with public expectation and value for money. Thus, the hypothesis:

H1. Compliance with public procurement regulatory framework in public road construction projects leads to project success.

Familiarity with Public Procurement Regulatory Framework

Familiarity means that a participant's knowledge of the entire regulatory framework extends beyond academic qualifications (Hunja, 2003). Public road construction project staff should be knowledgeable with project requirements for its successful implementation. There are limited studies that explore the relationship between familiarity and compliance (Eyaa & Oluka, 2011; Gelderman, Ghijsen, & Brugman, 2006). However, little is known about the relationship between familiarity and project success, a concept that this study explores. Construction projects bring together different

stakeholders with varying perceptions and attitude in executing respective project activities. This requires careful planning from project initiation stage to completion. This planning is driven by clear project definition and judicious staff selection. Selected staff should continuously undergo specific training to enhance their competence and familiarity with project requirements (North, 2016). When staff become familiar with project requirements, the project is completed effectively and within time (Sidwell, Kennedy, & Chan, 2002). For a successful public construction project, stakeholders should thoroughly understand its scope within a clear governing regulatory framework. This will help avoid manipulations (Tabish & Jha, 2011; Tabish & Jha, 2015). Aside from staff academic qualifications, understanding an entire public road construction project's implementation is intellectually demanding. By linking familiarity with a regulatory framework to construction project success, this study determines the relationship through proposed hypothesis:

H2. Familiarity with public procurement regulatory framework governing public road construction projects leads to project success.

Monitoring Activities

Monitoring is an organizational governance mechanism that ensures staff meet set goals for an organizations (North, 2016). Despite limited literature connecting project success and activity monitoring, regular monitoring of budgets for respective projects and implementing corrective actions are suitable courses of actions for successful project implementation (Jha & Misra, 2007; Lam et al., 2008). In Uganda monitoring is enforced by different agencies that include, Ministry of Works and Transport, Public Procurement and Disposal of Public Assets Authority and President's office among others. In these and similar authorities, policy makers should clearly define roles for each agency to avoid

conflict and confusion. Jha and Misra (2007) refers to these as well-defined systems for supervising and controlling personnel. Adding to this assertion, an example of a successful public procurement in the USA show benefits to the construction sector that resulted from effective monitoring and tracking contractors to avoid shoddy workmanship, cost overruns and corruption (Bartle & Korosec, 2003). Furthermore, monitoring irresponsible construction staff ensures safety compliance that enable more successful project execution (Love, Veli, Davis, Teo, & Morrison, 2016). Ineffective monitoring mechanisms and uncommitted contractors challenge the construction industry, thereby leading to failed construction projects (Ntayi et al., 2010). Whereas monitoring is effective in influencing behavior, it is an insignificant success factor in construction projects (Tabish & Jha, 2015). This study investigates the contradiction through proposed hypothesis:

H3. Monitoring activities on public road construction projects leads to project success.

Professionalism of Staff

Professionalism refers to one's competence in skills, special knowledge with experience and being a member of a professional body exhibiting an ethical code (Watson, 2002). Construction industry operators focus on achieving professionalism through professional bodies and code of conduct by benchmarking to ensure a successful corruption free industry (Sohail & Cavill, 2008). Professional competencies are crucial for successful project implementation (Ogunlana, Li, & Sukhera, 2003). In recognition of this perspective, Australia's public works departments are expected to have expertise in construction projects procurement to reduce reliance on external consultants and at the same time avoid diverting risk (Australian Procurement & Construction Council, 2002; Furneaux et al., 2006). Apparently, Uganda's construction industry has a paucity of

professional staff who lack necessary skills in construction procurement. This is explained as largely due to poor training and recruitment methods (Alinaitwe, Mwakali, & Hansson, 2007). This problem is not confined to Uganda, further examples are noted in the Gaza Strip (Enshassi, Mohamed, & Abushaban, 2009; Tayeh et al., 2018) and Ghana (Ameyaw et al., 2017).

Technically qualified staff need special project management skills for successful implementation supported through training, coaching and mentoring (Walker & Lloyd-Walker, 2015). Such construction skills should be determined during the tendering process (Runeson & Skitmore, 1999). Maintaining a stable workforce and encouraging strong relationships are of paramount for successful project implementation (Xiao & Proverbs, 2003). This competence has failed the construction industry (Alinaitwe et al., 2007). A shortage of skilled and experienced workforce is also challenging the construction industry globally thereby affecting project success (Faridi & El-Sayegh, 2006; Hanson, 2006; Sweis & Bisharat, 2014; Tabish & Jha, 2015). Productivity and construction performance is enhanced through a learning culture that transforms errors into experience by encouraging no blame philosophy in team work (Love & Smith, 2016). This experience enhances project success (Love, Ackermann, et al., 2015). This leads to the fourth hypothesis being:

H4. Professionalism of staff in public road construction projects leads to project success.

Perceived Inefficiency of Public Procurement Regulatory Framework

Inefficiency in the context of this research are described as loopholes within a regulatory framework that may be manipulated for personal interest at the time they are observed by unethical public procurement stakeholders. A regulatory framework governing complex public road construction projects should be clear and simple to allow

easy interpretation and assimilations. This ‘plain language’ approach that is largely supported in Australian contract law (see Latham and Egan, for example), reduces the opportunity for manipulators to pursue their particular ambitions (Wall & Ahmed, 2008). Correspondingly, public procurement in East Africa is challenged with unclear legal frameworks that currently required strengthening (Odhiambo & Kamau, 2003). In alternative circumstances, stakeholders simply balk at convoluted regulatory framework due to administrative failures and perceived time wastage (Boer & Telgen, 1998; Gelderman et al., 2006). Furthermore, consultative workshops public construction sector stakeholders and Public Procurement and Disposal of Public Assets Authority (PPDA) (2008), observed that major sector challenges included unclear National Construction Standards and regulations (PPDA Authority, 2008). These challenges create uncertainty with the regulatory framework and lead to failed project implementation.. A clear legal framework governing these projects is paramount for ease of project implementation. However, little is reported regarding linking perceived inefficiency of a regulatory framework to successful implementation of public road construction projects that this study is exploring through the proposed hypothesis:

H5. Perceived inefficiency of public procurement regulatory framework reduces project success.

Contractors’ Resistance to Non-Compliance

Contractors’ resistance in the context of this research refers to rejecting bad decisions of public officers regarding project execution. Public road construction stakeholders that are employed on specific projects display varying ambitions. Notably, on occasions their aspirations may be contrary to the project’s espoused success. Such unethical ambitions disrupt project implementation. Project success is contingent on teamwork with players’

commitment and cooperation (Ntayi et al., 2010). Contractors compete for limited government contracts and obtaining such contracts is based on previous performance and key deliverables including quality. Cases of note in Uganda have suggested that substandard work was attributed to limited residual funds for actual construction after expenses associated with lump sum bribes (PPDA Authority, 2009). Reputable contractors have their reputation to protect by providing quality road construction projects. They tend resist bad decisions of the nature described above. Compliance with regulatory frameworks is promoted if contractors take action against deviant public procurement officers (Gelderman, Ghijssen, & Schoonen, 2010). This study aims to ascertain whether public road construction projects success is linked to contractors' resistance to non-compliance with a regulatory framework through the proposed hypothesis:

H6. Contractor's resistance to non-compliance with public procurement regulatory framework by public officers in public road construction projects leads to project success.

Sanctions on Staff

Sanction in the context of this research are range of penalties levied upon staff working contrary to construction codes (Hartley, 2009). Sanctions are widely applied to militate the actions of deviant staff (Scheer & Stern, 1992). Public road construction projects are designed for a specific purpose using taxpayer's money through Government who are liable to ensure that the funded projects conform to their predetermined targets. Punitive measures are proposed to tame deviant stakeholders in achieving these targets. Many construction projects have failed because of laxity in enforcing punitive actions and ineffective sanctions encourage unethical acts among project implementers (Paulson Jr & Fondahl, 1983). Because public road construction projects involve multiple

stakeholders and are co-funded by multilateral bodies, sanctions are necessary to manage these multiple funds. Strict punitive actions against perpetrators failing project success is necessary to avoid suspension of funding by respective international bodies like in Bangladesh where the World Bank suspended the funding of fourteen highway roads (Mahmood, 2010). Globally, many nations rely on public road networks for massive economic transformation through prosperity for all and a modernization of agriculture among other programs. However, public road construction projects are significant in facilitating these programs in order to achieve government objectives. Thus, in Uganda strong enforcement mechanisms involving sanctions are required for successful public road project implementation (Ministry of works and Transport, 2012). Such measures on violators are vital during the tendering process (Runeson & Skitmore, 1999). Enforcing sanctions has successfully encouraged productivity in Australian construction projects by reducing unacceptable practices (Hartley, 2009). According to Mbabazi, Karuhanga, and Maurice (2015), the World Bank reports that US\$100 million is wasted annually through public procurement system because violators are not sanctioned. This calls for enforcing contractual obligations and sanctions to successfully implement construction projects (Kenny, 2007). Forfeiture of contract and black listing guilty companies for future bidding are effective punitive actions for an efficient construction industry (Sohail & Cavill, 2008). This leads to the last hypothesis being:

H7. Sanctions on staff in public road construction projects leads to project success.

Research Model

The conceptual model illustrates the relationship between seven independent variables and project success as depicted in Figure 1 and expressed through hypotheses H1-H7.

(Insert Fig 1 here)

Methodology

A deductive research approach was adopted due to its ability in testing directional hypotheses for constructs' relationships, strength and variance through statistical techniques (Saunders, 2012). Causal relationships expressed by H1-H7 were assessed.

Research Design

A cross-sectional research quantitative design with a quantitative approach was adopted since it enables linking data to hypotheses, model development and generalizing results (Barratt & Kirwan, 2009). The statistical techniques used in such studies are good for accuracy, validity, reliability, generalizability and objectivity compared to the qualitative approach (Sekaran & Bougie, 2010). After a comprehensive literature review of peer-reviewed journals and public documents (See Table 1), eight study variables were established as probable factors for project success and thus the basis for the conceptual model in Figure 1. Structured questionnaires were developed capturing the eight study variables. All measurement items for each variable were adopted from previous studies, modified accordingly to fit current study and applied on a five-Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Uganda was selected as the focus country of study. The reason being the plethora of complaints in roads subsector New Vision (20th October 2016) and also that this subsector is over 80% donor funded. A population of 1300 employees from the five entities was considered. The entities included; Ministry of Works and Transport, Uganda National Roads Authority, Public Procurement and Disposal of Public Assets Authority, Uganda Road Fund and the contractors. According to Krejcie and Morgan (1970) determination of sample size given in tables, an appropriate sample of 299 respondents were statistically obtained. Proportionate stratified random sampling was used to select respondents from

the respective departments in participating entities. The final questionnaires were physically delivered to selected respondents with help from appointed research assistants. Some staff within the entities were appointed to make follow-up reminders before collecting completed questionnaires. A response rate of approximately 65% (194) was achieved.

Validity and Reliability

The questionnaire was validated based on a pilot survey in which selected construction experts including project and construction managers in New South Wales, Australia were involved. This involved rewording the instrument and deleting ambiguous statements. Through Smart-PLS3 software, PLS-algorithm with factor analysis was conducted to obtain measurement indicators. This software has robust techniques in handling non-normal data, simultaneous analysis and suitable for small samples compared to Covariance Based Structural Equation Modeling (CB-SEM) (Liu, Zhao, & Yan, 2016). Composite reliability was used to test for internal consistence instead of Cronbach Alpha because it gives more accurate parameter estimations (Chin, 2010). Cronbach Alpha that is regularly used within SPSS software provides low bound approximation because of violating the tau-equivalency assumptions compared to composite reliability commonly used in Smart-PLS. Convergent validity was also determined. The Average Variance Extracted (AVE) was used to measure representativeness of measurement items in respective variables which was useful in determining construct validity and tests for model development (Hair, Sarstedt, Pieper, & Ringle, 2012). Discriminant validity was also determined to ensure that the indicators measure what they are supposed to, through a more reliable Hetrotraint-Monotraine ratio (HTMT) (Hair et al., 2017; Rasoolimanesh, Ringle, Jaafar, & Ramayah, 2017).

Data Processing and Analysis

The analysis focused on study hypotheses within research question's scope. To achieve this, a Structural Equation Model (SEM) was estimated using Smart-PLS3. Despite PLS-SEM's flexibility with less stringent constraints, some level of data screening was necessary prior to model estimation (Henseler, Ringle, & Sinkovics, 2009). Data was screened to ensure completeness and accuracy. Outliers, missing values, reliability, validity, normality and multi-collinearity were checked and handled. The purification was mainly concerned with obtaining final measurement items with high inter-correlations for internal consistency especially in reflective models (Diamantopoulos & Sigauw, 2006).

Unidimensionality: This aimed at determining indicators relative to particular variable better than any other variable since reflective models' variables are supposed to be unidimensional (Kline, 2015). This was handled by assessing HTMT values to determine discriminant validity.

Collinearity: Extreme collinearity is an issue of discriminant validity since highly correlated variables seem to measure the same thing and hence leading to poor model prediction. This was solved by running PLS-algorithm and verifying Variance Inflation Factor (VIF).

Outliers: Data screening aimed at getting rid of outliers that affect results by either overstating or understating model coefficients. Extreme scores were converted to a value equal to next most extreme score that is within three standard deviations of the mean after a descriptive analysis. The Z score was used with the conditions: $Z \geq \pm 2.5$ (i.e. $Z \geq -2.5$ implying extreme low value and hence add 1 to that value; and $Z \geq 2.5$, implying high extreme value and hence subtract 1 from that value).

Missing data: Missing data occurs when certain values are skipped during data inputting or respondents' failure to answer certain questions. Available case method was adopted for missing data by running frequencies for each questionnaire item. Two returned questionnaires with only one section completed amounting to 84.8% of total missing data. These were removed from the analysis to avoid distortion of predicted variable relationships (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). Thus only 192 questionnaires received were used. Quality analysis was maintained (Kline, 2015).

Normality test: This is concerned with data distribution. Some level of fair normal distribution is paramount in yielding strong significant findings and recommendation (Henseler et al., 2009). A test for normality was based on Skewness and Kurtosis results.

Path Coefficients and Significance Levels

PLS-Algorithm was performed for model identification and predicting the relationship between study variables. Path coefficients in Table 7 were evaluated. Values above 0.1 indicate that independent variable is well represented and model well identified (Hair, Sarstedt, Pieper, et al., 2012). While bootstrapping resampling was run with 5000 bootstrap samples to determine significance of prediction. This formed the basis for accepting or rejecting stated hypotheses. Good model fit is achieved with significant path coefficients, high coefficient of determination (R^2) and construct reliability value ≥ 0.7 (Gefen, Straub, & Boudreau, 2000). Analysis converged at 11 interactions far below the pre-set 300-stop criterion, implying good convergence and prediction. Model fit was determined through Standardized Root Mean Square Residue (SRMR) based on PLS-algorithm and bootstrapping resampling techniques (Ringle, Wende, & Becker, 2015).

Results and Discussions

This section presents Structural Equation Modeling (SEM) results and discussions. A preliminary analysis for measurement model assessment is presented, followed by a structural model assessment through collinearity, path coefficient and coefficient of determination (R^2) and model fit.

All constructs reliability coefficients are above 0.7 and indicator loadings are above 0.6 showing good internal consistence and indicator reliability respectively, as depicted in Tables 2 and 3 (Urbach & Ahlemann, 2010). All AVE values are greater than 0.5 showing that the latent construct explains more than 50% variance of its indicators representing sufficient convergent validity as shown in Table 2 (Urbach & Ahlemann, 2010). All HTMT values are below 0.85 demonstrating good discriminant validity as presented in Table 4 (Rasoolimanesh et al., 2017). All VIF values in Table 2 are below 2 and far below the recommended threshold of 5, implying that multicollinearity was not a problem (Hair, Sarstedt, Ringle, & Mena, 2012). While Skewness and kurtosis statistics for all study variables are respectively within acceptable limits of ± 3 and ± 5 as seen in Table 5 exhibiting fairly normal distribution (Jondeau & Rockinger, 2003).

(Insert Table 2-5 here)

Compliance with Public Procurement Regulatory Framework and Public Road

Construction Project Success

There is a significant positive relationship between compliance with public procurement regulatory framework and success of public road construction projects ($\alpha = 0.147$, $t = 1.960$, $p = 0.05$) at 5% significance level. This implies that compliance with public procurement regulatory framework predicted and enhances public road construction projects' success. Therefore, H1 is significantly supported and in line with

institutional theory and earlier scholars (Tabish & Jha, 2011). Complying with regulatory framework governing these projects during implementation ensures achievement of Government objectives, transparency and accountability (Lisa, 2010; Obanda, 2010). Thus, the key indicators of compliance; proper authorization of road construction projects, timely delivery of road construction projects, timely recording of road construction transactions and achieving project objectives should be emphasized to all stakeholders.

Familiarity with Public Procurement Regulatory Framework and Public Road Construction Project Success

There is a significant positive relationship between familiarity with public procurement regulatory framework and public road construction project success ($\alpha = 0.140$, $t = 2.231$, $p = 0.026$) at a 5% significance level. This implies that familiarity with a public procurement regulatory framework predicted and enhances success of public road construction projects. H2 is significantly supported. Thus, successful project implementation relies on a team's thorough understanding of project details for easy assimilation and avoidance of deliberate or inadvertent misinterpretation. Improving staff familiarity is key and can be enhanced through training and induction. This follows a major contention of institutional theory (North, 1993; Tabish & Jha, 2015). This approach ensures compliance and successful public road construction implementation meeting Government objectives (PPDA Authority, 2009; Uganda National Road Authority, 2014). Many construction projects have failed because staff are unfamiliar with project requirements (Mahmood, 2010). Accordingly, these results suggest that management endeavour to improve their staff levels of familiarity; employ staff with appropriate

academic qualifications and familiarise them with project implementation procedures and policies.

Monitoring Activities and Public Road Construction Project Success

There is a significant positive relationship between monitoring activities on public road construction projects and success of these projects ($\alpha = 0.314$, $t = 4.875$, $p = 0.000$) at a 1% significance level. This implies that effective monitoring of public road construction projects enhances the success of these projects. Thus, H3 is significantly supported. Whereas findings conform to institutional theory and studies in transport infrastructure management for successful construction projects (Love, Veli, et al., 2016; North, 2016), they contradict Tabish and Jha (2015) who found an insignificant relationship between monitoring and project success. Alternatively, (Jha & Misra, 2007) assert that regularly supervising public construction projects ensures staff are directed towards meeting set objectives that define successful implementation. Furthermore, monitoring public road construction activities prevents undesirable behaviour among an implementation team ensuring that the project meets government demands and value for money (DiMaggio & Powell, 2015; Van Slyke, 2007).

Following these arguments, management should increase monitoring of public road construction projects to allow identifying areas of improvement. Management can achieve this through frequent inspections to check on timely recording of project progress, timely project completion and proper road material storage methods since these indicators strongly measure monitoring public road construction activities.

Professionalism of Staff on Public Road Construction Projects and Project

Success

There is a significant positive relationship between professionalism of staff on public road construction projects and success of these project ($\alpha = 0.305$, $t = 4.695$, $p = 0.000$) at a 1% significance level. This implies that professionalism of staff strongly predicts successful public road project implementation, hence H4 is supported. These findings correspond to limited construction studies that contend that project performance is associated with staff competence and specialized skills falling within institutional isomorphism (Alinaitwe et al., 2007; DiMaggio & Powell, 2015; Walker & Lloyd-Walker, 2015). A lack of professionalism among staff affects compliance with project implementation requirements including its governing regulatory framework. This impacts on successful public road implementation (Basheka & Mugabira, 2008). Improving staff skills and competence promote professionalism in accomplishing road construction projects (Kalinzi, 2014). Staff competence, experience, integrity and confidentiality as key indicators of staff professionalism are paramount during public road implementation to successfully meet Government objectives. This can be enhanced through training and ethical code (Boer & Telgen, 1998; PPDA Authority, 2016).

Perceived Inefficiency of Public Procurement Regulatory Framework and

Public Road Construction Project Success

There is a significant inverse relationship between perceived inefficiency of public procurement regulatory framework and public road construction projects' success ($\alpha = -0.135$, $t = 2.099$, $p = 0.036$) at 5% significance level. Hence, H5 is significantly supported. This implies that perceived inefficiency of public procurement regulatory framework negatively predicts public road construction projects' success. The findings confirm that

successful organizations relies on effective institutional norms (Oliver, 1991). Successful public road implementation requires stakeholders understand the project scope. There should be clear governing regulatory framework capable of deterring manipulations (Tabish & Jha, 2011; Tabish & Jha, 2015). To avoid inefficiencies or loopholes, management can ban negotiation between contractors and public officers, disallow contract extensions beyond agreed periods and disengage with underperforming contractors to enhance efficient and effective regulatory framework governing these projects. Emphasizing these policies would ensure that regulatory framework governing road construction projects is clear and effectively implemented, avoiding manipulations (Thai, 2008).

Contractors' Resistance to Non-Compliance with Public Procurement

Regulatory Framework and Public Road Construction Project Success

There is an insignificant relationship between contractors' resistance to non-compliance and public road construction projects' success ($\alpha = 0.121$, $t = 1.792$, $p = 0.073$) at 5% significance level. This implies that contractors' resistance to non-compliance with public procurement regulatory framework governing public road construction projects does not enhance public road construction project success. Hence, H6 is not statistically supported. This is in line with (Gelderman et al., 2010) who suggest that contractors' resistance did not significantly influence compliance with EU directives in public procurement among Dutch municipalities and that if it is to hold, it should be considered based on organizational objectives with effective mechanism to deter deviant public officers from retaliating. Additionally, institutional theory contends that success comes with different perception of organizational norms since different players have specific reasons to do the right thing (Greenwood & Hinings, 1996).

Sanctions on Staff and Public Road Construction Project Success

There is an insignificant inverse relationship between sanctions on staff and public road projects' success ($\alpha = -0.059$, $t = 0.856$, $p = 0.392$) at 5% significance level. This implies that sanctions imposed on these staff didn't predict success of public road construction projects. Imposing penalties on staff involved in projects doesn't lead to improvement in the implementation process. Hence, H7 is not supported. Findings contradict a number of scholars; Mwakibinga and Buvik (2013) study that concluded sanctions are capable of ensuring compliance with regulatory framework; Kakitahi, Alinaitwe, and Mone (2016) who asserted that strict penalties are inevitable in implementing construction projects. In addition, findings contradict Sohail and Cavill (2008) and Hartley (2009) proposal of using sanctions in Australian construction industry in preventing irregularities. However, (Gunningham & Kagan, 2005) suggests that sanctions can be applied with careful considerations and the level of enforcement depends on stakeholder's attitude and interest in meeting project objectives (Saam, 2007). This is attributed to different stakeholders' perception on sanctions in comparison to their contribution and level of expertise.

Coefficient of Determination (R^2) and Model Fit

Using PLS-algorithm and bootstrap output, the coefficient of determination was used determine the predictive power of project success. Explained variance of the seven independent variables was considered. Bootstrapping results indicate that R^2 is substantially significant with $SRMR \leq 0.08$ as depicted in Table 6 (Project success, $R^2 = 0.552$, $p < 0.000$, $SRMR = 0.068$, $p < 0.001$). Hence, the model fits the data well (Gefen et al., 2000).

(Insert Table 6 here)

Study Implications

The aim of this study was to discover success factors for implementing public road construction projects. The results show that compliance with the public procurement regulatory framework, familiarity with this regulatory framework, monitoring activities, professionalism of staff involved in public road construction projects and perceived inefficiency of the public procurement regulatory framework are significant factors influencing successful implementation of public road construction projects. These results suggest that both private and public management and Government instrumentalities focus their attention on these factors to enhance the implementation process of road construction projects.

The study was based on a sample from Uganda's public road construction subsector and accordingly, the results should be cautiously applied beyond Uganda. However, unique considerations are required because public road construction projects are complex. The study involved both public and private stakeholders in the road construction subsector and results have shown high internal consistence, strong indicators of reliability, convergent and discriminant validities. Thus, provide Governments and future researchers with a solid base from which to explore further.

Knowledge Contribution

The study contributes to construction management and public procurement literature by identifying the effect that several variables have on the successful implementation of road construction projects. Researchers are recommended to shift from typical 'iron triangle' project success factors such as time, cost, quality and, safety and consider these new factors in meeting project objectives.

Recommendations

The Ugandan government and similar developing countries should embark on improving monitoring mechanisms and staff familiarity with public procurement regulatory frameworks since they positively impact on successful implementation of public road construction projects. Strengthening and clarifying requisite public procurement regulatory frameworks should be enforced to avoid manipulations by unethical project stakeholders especially with regard to contract cost variation during implementation as these are a particularly problematic area (Love, Dominic, et al., 2016). Regulatory frameworks should be written in a less technical language that is easily interpreted by all stakeholders. Management should encourage qualified and competent staff to the core team of public road construction projects' implementation. This would be through transparent and merit based selection criterion demanding appropriate academic qualifications and experienced competent teams. Given the complexity of this subsector, multidimensional skills are required and management should embrace continuous professionalism of public road subsector procurement. Professionalism in the subsector may be harmonized with international standards and emphasised through enforcing ethical standards, empowering staff with autonomy of upholding their decisions and shielding them from political interference. Stakeholders should be encouraged to register with international professional bodies, for example, the Institute of Procurement Professionals and Professional Engineers among others. These bodies should be fully empowered to enforce standards in public procurement and construction sectors. These recommendations are vital for Uganda, other developing countries and first world countries. They would assist with problems identified, for example in Australia, United Kingdom, Gaza Strip, Nigeria and Ghana (Ameyaw et al., 2017; Gledson et al., 2018; Love, Dominic, et al., 2016; Tayeh et al., 2018; Zadawa et al., 2018).

Conclusion and Limitations

A validated project success model is established to guide public road construction project implementation. It is suggested that utilising the model could save Governments' significant funds and consequently increase the procurement of paved road networks for economic development in Uganda. Complex public road construction projects with huge budget allocations, *ceteris paribus*, nature unprofessional behaviour if left unchecked or appropriately regulated. This serves to negatively affect a Governments' attainment of project success. Five significant project success factors for public road construction projects are surfaced, specifically: emphasizing sound regulatory frameworks; compliance; familiarity; monitoring activities; and professionalism.

In as much as the current project success model within this research is developed and tested for future use, the factors used are not exhaustive. This requires scholars to investigate further to bring on board other factors for a comprehensive project success model. Whereas this model included seven success factors, it appears this is the first of its kind and for consistence and reliability using the same factors in other sectors globally would generalise their application. Study results show that some factors are significant while others are not. Some results contradict theory and thus there is need to negate this inconsistency through conducting similar research.

Limited literature on public road construction projects affected study examples and relied on international literature from developed countries that include United States (US), United Kingdom (UK) and Australia among others. Since there is a substantial difference in each country's jurisdiction, with varying problem causes, examples used may have a different impact on successful public road construction project implementation. The study emphasized Government agencies in road construction and paid limited attention to the private sector that could have furnished additional relevant

information. Despite involving road contractors, their representation within the private sector appeared insufficient. There were challenges for the research team in accessing premises and respondents failing to complete questionnaires. The study was purely academic and identification of participants was completely anonymous. Furthermore, the research permit from the University of Newcastle's Human Research ethics committee was used to reassure participants. This resulted in a 64.9% response rate with relevant data ensuring the success of the study.

Acknowledgement

This paper is part of lead author's PhD which is fully sponsored by the Commonwealth Government of Australia through the University of Newcastle Australia. In this regard, the lead author thanks Australian Commonwealth Government and the University of Newcastle for their support. Special thanks go to the supervisors for tireless supervision and guidance. The authors further thank the Journal of Construction Engineering and Management editorial team for their initial comments and suggestions that have led to improvements being made to this paper.

References

- Agaba, E., & Shipman, N. (2007). Public procurement reform in developing countries: The Ugandan experience. *Advancing Public Procurement: Practices, Innovation and Knowledge-Sharing*, 373-391.
- Alinaitwe, Mwakali, J. A., & Hansson, B. (2007). Factors affecting the productivity of building craftsmen-studies of Uganda. *Journal of Civil Engineering and Management*, 13(3), 169-176.
- Ameyaw, E. E., Pärn, E., Chan, A. P., Owusu-Manu, D.-G., Edwards, D. J., & Darko, A. (2017). Corrupt practices in the construction industry: Survey of Ghanaian experience. *Journal of Management in Engineering*, 33(6), 05017006.
- Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International journal of project management*, 17(6), 337-342.
- Australian Procurement & Construction Council. (2002). *Procurement Guide*. Australia: Australian Procurement & Construction Council Retrieved from www.APCC.gov.au.
- Barratt, H., & Kirwan, M. (2009). Confounding, interactions, methods for assessment of effect modification. In: HealthKnowledge.

- Bartle, J. R., & Korosec, R. L. (2003). A review of state procurement and contracting. *Journal of public procurement*, 3(2), 192.
- Basheka, & Mugabira, M. I. (2008). *Measuring professionalism variables and their implication to procurement outcomes in Uganda*. Paper presented at the The 3rd International Public Procurement Conference Proceedings.
- Boer, Matthias, Martin, M. P., & Roger, C. V. (2014). Making a meaningful contribution to theory Harry Boer Matthias Holweg Martin Kilduff Mark Pagell Roger Schmenner Chris Voss. *Management*, 35(9), 1231-1252.
- Boer, & Telgen, J. (1998). Purchasing practice in Dutch municipalities. *International Journal of Purchasing and Materials Management*, 34(1), 31-36.
- Bruton, G. D., Ahlstrom, D., & Li, H. L. (2010). Institutional theory and entrepreneurship: where are we now and where do we need to move in the future? *Entrepreneurship theory and practice*, 34(3), 421-440.
- Chin, W. W. (2010). How to write up and report PLS analyses. In *Handbook of partial least squares* (pp. 655-690): Springer.
- Diamantopoulos, A., & Siguaw, J. A. (2006). Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*, 17(4), 263-282.
- DiMaggio, P. J., & Powell, W. W. (1991). *The new institutionalism in organizational analysis* (Vol. 17): University of Chicago Press Chicago, IL.
- DiMaggio, P. J., & Powell, W. W. (2015). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields [1983]. *Contemporary sociological theory*, 175.
- Dvir, D., & Lechler, T. (2004). Plans are nothing, changing plans is everything: the impact of changes on project success. *Research Policy*, 33(1), 1-15.
- Enshassi, A., Mohamed, S., & Abushaban, S. (2009). Factors affecting the performance of construction projects in the Gaza Strip. *Journal of Civil Engineering and Management*, 15(3), 269-280.
- Eyaa, S., & Oluka, P. N. (2011). Explaining non-compliance in public procurement in Uganda. *International Journal of Business and Social Science*, 2(11).
- Faridi, A. S., & El-Sayegh, S. M. (2006). Significant factors causing delay in the UAE construction industry. *Construction Management and Economics*, 24(11), 1167-1176.
- Ford, B. (2011). Overruns add millions to the cost of state road projects. *New England National Centre for Investigative Reporting*.
- Furneaux, C. W., Brown, K. A., Allan, D., McConville, S., McFallan, S., London, K., & Burgess, J. (2006). Client capabilities and capital works procurement policies: A comparative analysis of Australian jurisdictions. Brown, K., K. Hampson and P. Brandon. *Clients Driving Construction Innovation: Moving Ideas into Practice*. Brisbane: Cooperative Research Centre for Construction Innovation, Icon. Net Pty Ltd, 62-71.
- Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33(6), 897-920.
- Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the association for information systems*, 4(1), 7.
- Gelderman, Ghijzen, P., & Schoonen, J. (2010). Explaining Non-Compliance with European Union Procurement Directives: A Multidisciplinary Perspective. *JCMS: Journal of Common Market Studies*, 48(2), 243-264.

- Gelderman, Ghijsen, P. W. T., & Brugman, M. J. (2006). Public procurement and EU tendering directives-explaining non-compliance. *International Journal of Public Sector Management*, *19*(7), 702-714.
- Gledson, B., Williams, D., & Littlemore, M. (2018). Construction Planning Efficiency and Delivery Time Performance: Analysing Failure in Task-Level 'Hit Rates'.
- Greenwood, R., & Hinings, C. R. (1996). Understanding radical organizational change: Bringing together the old and the new institutionalism. *Academy of management review*, *21*(4), 1022-1054.
- Gunningham, N., & Kagan, R. A. (2005). Regulation and business behavior*. *Law & Policy*, *27*(2), 213-218.
- Hair, Hair, J., Hollingsworth, C. L., Hollingsworth, C. L., Randolph, A. B., Randolph, A. B., . . . Chong, A. Y. L. (2017). An updated and expanded assessment of PLS-SEM in information systems research. *Industrial Management & Data Systems*, *117*(3), 442-458.
- Hair, Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2), 106-121.
- Hair, Sarstedt, M., Pieper, T. M., & Ringle, C. M. (2012). The use of partial least squares structural equation modeling in strategic management research: a review of past practices and recommendations for future applications. *Long range planning*, *45*(5), 320-340.
- Hair, Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing science*, *40*(3), 414-433.
- Hanson, D. N. (2006). *CAUSES OF CLIENT DISSATISFACTION IN THE SOUTH AFRICAN BUILDING INDUSTRY AND WAYS OF IMPROVEMENT: THE CONTRACTORS' PERSPECTIVES*. Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg,
- Hartley, R. (2009). Fighting corruption in the Australian construction industry: The national code of practice. *Leadership and Management in Engineering*, *9*(3), 131-135.
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *New challenges to international marketing* (pp. 277-319): Emerald Group Publishing Limited.
- Hunja, R. R. (2003). Obstacles to public procurement reform in developing countries. *Public Procurement: The Continuing Revolution*, *Kluwer Law International*, 13-22.
- Jha, K., & Misra, S. (2007). Ranking and classification of construction coordination activities in Indian projects. *Construction Management and Economics*, *25*(4), 409-421.
- Jondeau, E., & Rockinger, M. (2003). Conditional volatility, skewness, and kurtosis: existence, persistence, and comovements. *Journal of Economic dynamics and Control*, *27*(10), 1699-1737.
- Kakitahi, Alinaitwe, H. L., Anne, & Mone, S. H., TheoC. (2016). Impact of construction-related rework on selected Ugandan public projects. *Journal of Engineering, Design and Technology*, *14*(2).
- Kakitahi, Landin, A., & Alinaitwe, H. M. (2013). An exploratory study of rework causality in Uganda. [scopus 7/6/2016]. *Construction innovation*, *13*(3), 266-280. doi:10.1108/CI-Nov-2011-0051
- Kalinzi, C. (2014). Level of professionalism in public procurement: A survey of selected

- districts in Uganda. *Net Journal of Business Management*, 2(1), 1-7.
- Kenny. (2007). Construction, corruption, and developing countries. *World Bank Policy Research Working Paper*(4271).
- Kline, R. B. (2015). *Principles and practice of structural equation modeling*: Guilford publications.
- Kondra, A. Z., & Hinings, C. R. (1998). Organizational diversity and change in institutional theory. *Organization studies*, 19(5), 743-767.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educ psychol meas.*
- Lam, E. W., Chan, A. P., & Chan, D. W. (2008). Determinants of successful design-build projects. *Journal of Construction Engineering and Management*, 134(5), 333-341.
- Langston, C. (2014). Construction efficiency: A tale of two developed countries. [scopus 7/6/2016]. *Engineering, Construction and Architectural Management*, 21(3), 320-335. doi:10.1108/ECAM-02-2013-0014
- Lisa, I. (2010). Compliance culture. A conceptual framework. *Journal of management and organization*, 19(7), 702-714.
- Liu, J., Zhao, X., & Yan, P. (2016). Risk paths in international construction projects: Case study from Chinese contractors. *Journal of Construction Engineering and Management*, 142(6), 05016002.
- Love. (2002). Influence of project type and procurement method on rework costs in building construction projects. [scopus 7/6/2016]. *Journal of Construction Engineering and Management*, 128(1), 18-29. doi:10.1061/(ASCE)0733-9364(2002)128:1(18)
- Love, Ackermann, F., Teo, P., & Morrison, J. (2015). From individual to collective learning: A conceptual learning framework for enacting rework prevention. *Journal of Construction Engineering and Management*, 141(11), 05015009.
- Love, Dominic, A.-D., & Zahir Irani. (2016). cost overrun in transportation infrastructure projects: Sowing the seeds for a probabilistic theory of causation. *Elsevier*, 11.
- Love, Gunasekaran, A., & Li, H. (1998). Concurrent engineering: a strategy for procuring construction projects. *International journal of project management*, 16(6), 375-383.
- Love, & Smith, J. (2016). Toward Error Management in Construction: Moving beyond a Zero Vision. *Journal of Construction Engineering and Management*, 04016058.
- Love, Smith, J., Simpson, I., Regan, M., & Olatunji, O. (2015). Understanding the landscape of overruns in transport infrastructure projects. *Environment and Planning B: Planning and Design*, 42(3), 490-509.
- Love, Veli, S., Davis, P., Teo, P., & Morrison, J. (2016). See the Difference in a Precast Facility: Changing Mindsets with an Experiential Safety Program. *Journal of Construction Engineering and Management*, 05016021.
- Mahmood, S. A. I. (2010). Public procurement and corruption in Bangladesh confronting the challenges and opportunities. *Journal of public administration and policy research*, 2(6), 103.
- Mbabazi, Karuhanga, & Maurice, M. (2015). Compliance and Service delivery ; Case of Local Government procurement Units in Uganda.
- Ministry of works and Transport. (2012). *Annual Sector Performance Report*. Retrieved from Kampala Uganda: www.MoWT.go.ug
- Ministry of Works and Transport. (2014). *Annual Worrks and Transport Sector Performance Report 2013/2014*. Retrieved from Kampala Uganda: www.works.go.ug

- Munyasya, B., & Chileshe, N. (2018). Towards Sustainable Infrastructure Development: Drivers, Barriers, Strategies, and Coping Mechanisms. *Sustainability*, 10(12), 4341.
- Mwakibinga, & Buvik, A. (2013). An empirical analysis of coercive means of enforcing compliance in public procurement. *Journal of public procurement*, 13(2), 243.
- New Vision. (20th October 2016). UNRA queried over sh300b contract Kanoni-Ssembabule-Villa maria road, News paper. Retrieved from https://www.google.com.au/search?q=New+Vision,+20th+October+2016.+UNRA+queried+over+sh300b+contract+Kanoni-Ssembabule-Villa+maria+road.&rlz=1C1GGRV_enAU787AU787&tbo=u&source=univ&sa=X&ved=2ahUKEwier7nhiYPfAhUBeisKHR3ADIQQ7A16BAGFEA0&biw=1920&bih=920
- Ngacho, C., & Das, D. (2014). A performance evaluation framework of development projects: An empirical study of Constituency Development Fund (CDF) construction projects in Kenya. *International journal of project management*, 32(3), 492-507.
- North, D. C. (1993). Institutional change: a framework of analysis. *Institutional change: Theory and empirical findings*, 35-46.
- North, D. C. (2016). Institutions and economic theory. *The American Economist*, 61(1), 72-76.
- Ntayi, Rooks, Eyaa, & Qian. (2010). Perceived project value, opportunistic behavior, interorganizational cooperation, and contractor performance. [scopus 7/6/2016]. *Journal of African Business*, 11(1), 124-141. doi:10.1080/15228911003608603
- Obanda, W. (2010). Fighting corruption in tactical procurement. *Unpublished PHD dissertation. University of Twente.*
- Odeck, J. (2004). Cost overruns in road construction—what are their sizes and determinants? *Transport policy*, 11(1), 43-53.
- Odhiambo, W., & Kamau, P. (2003). Public Procurement: Lessons from Kenya, Tanzania and Uganda, OECD Development Centre Working Papers 208, OECD Publishing.
- Ogunlana, S. O., Li, H., & Sukhera, F. A. (2003). System dynamics approach to exploring performance enhancement in a construction organization. *Journal of Construction Engineering and Management*, 129(5), 528-536.
- Oliver, C. (1991). Strategic responses to institutional processes. *Academy of management review*, 16(1), 145-179.
- Paulson Jr, B. C., & Fondahl, J. W. (1983). Craft Jurisdiction Impact on Construction. *Journal of Construction Engineering and Management*, 109(4), 369-386.
- PPDA Authority. (2008). *Workshop on challenges facing construction sector in Uganda*. Retrieved from Kampala, Uganda: https://www.google.com.au/search?q=2008PPDA+Workshop+on+challenges+facing+construction+sector+in+Uganda&rlz=1C1GGRV_enAU787AU787&tbo=u&source=univ&sa=X&ved=2ahUKEwje8tGviIPfAhWSTX0KHVJVCzMQsAR6BAGEEAE&biw=1920&bih=920
- PPDA Authority. (2009). *Second Public Procurement Integrity Survey*. Retrieved from Kampala Uganda: https://scholar-google-com-au.ezproxy.newcastle.edu.au/scholar?hl=en&q=The+2nd+Public+Procurement+Integrity+Survey+Report+-+PPDA&btnG=&as_sdt=1%2C5&as_sdtp=
- PPDA Authority. (2016). *Third Public procurement Integrity Survey*. Retrieved from Kampala Uganda: <https://www.google.com.au/search?q=PPDA+3RD++Integrity+Survey.&rlz=1C>

1GGRV_enAU787AU787&tbm=isch&tbo=u&source=univ&sa=X&ved=2ahUKewiMg_qLh4PFAhVXFH0KHx6CJoQ7Al6BAgGEBM&biw=1920&bih=920

- Rasoolimanesh, S. M., Ringle, C. M., Jaafar, M., & Ramayah, T. (2017). Urban vs. rural destinations: Residents' perceptions, community participation and support for tourism development. *Tourism Management*, 60, 147-158. doi:<http://doi.org/10.1016/j.tourman.2016.11.019>
- Ringle, Wende, S., & Becker, J. (2015). SmartPLS. Boenningstedt, Germany: SmartPLS GmbH. In.
- Runeson, G., & Skitmore, M. (1999). Tendering theory revisited. *Construction Management & Economics*, 17(3), 285-296.
- Saam, N. J. (2007). Asymmetry in information versus asymmetry in power: Implicit assumptions of agency theory? *The Journal of Socio-Economics*, 36(6), 825-840.
- Saunders, M. N. (2012). Choosing research participants. *Qualitative organizational research: Core methods and current challenges*, 35-52.
- Scheer, L. K., & Stern, L. W. (1992). The effect of influence type and performance outcomes on attitude toward the influencer. *Journal of Marketing Research*, 128-142.
- Scott. (1995). Institutions and organizations. Foundations for organizational science. London: A Sage Publication Series.
- Scott. (2005). Institutional theory: Contributing to a theoretical research program. *Great minds in management: The process of theory development*, 460-485.
- Scott. (2013). *Institutions and organizations: Ideas, interests, and identities*: Sage Publications.
- Sekaran, U., & Bougie, R. (2010). Research methods for business: A skill building approach. *Research methods for business: A skill building approach*. Wiley.
- Sidwell, A., Kennedy, R., & Chan, A. (2002). Re-engineering the construction delivery process-report and case studies. *Construction Industry Institute*.
- Snyder, C. S. (2013). *A User's Manual to the PMBOK Guide*: John Wiley & Sons.
- Sohail, M., & Cavill, S. (2008). Accountability to prevent corruption in construction projects. *Journal of Construction Engineering and Management*, 134(9), 729-738.
- Sweis, R. B., S. M., & Bisharat, L. S., G. J. (2014). Factors affecting contractor performance on public construction projects. [Scopus 14/6/2016]. *Life Science Journal*, 11(SPEC. ISSUE 4), 28-39.
- Tabish, S. Z. S., & Jha, K. N. (2011). Identification and evaluation of success factors for public construction projects. *Construction Management & Economics*, 29(8), 809-823. doi:10.1080/01446193.2011.611152
- Tabish, S. Z. S., & Jha, K. N. (2015). POINT of VIEW Success factors for safety performance in public construction projects. [Scopus 14/6/2016]. *Indian Concrete Journal*, 89(2), 58-72.
- Tayeh, B. A., Al Hallaq, K., Alaloul, W. S., & Kuhail, A. R. (2018). Factors Affecting the Success of Construction Projects in Gaza Strip. *The Open Civil Engineering Journal*, 12(1).
- Thai, K. V. (2008). *International handbook of public procurement*: CRC Press.
- Uganda National Road Authority. (2014). *End of year performance workshop*. Retrieved from Kampala Uganda: www.unra.go.ug
- Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *JITTA: Journal of Information Technology Theory and Application*, 11(2), 5.

- Van Slyke, D. M. (2007). Agents or stewards: Using theory to understand the government-nonprofit social service contracting relationship. *Journal of Public Administration Research and Theory*, 17(2), 157-187.
- Walker, & Lloyd-Walker, M. B. (2015). *Collaborative project procurement arrangements*.
- Wall, J., & Ahmed, V. (2008). Use of a simulation game in delivering blended lifelong learning in the construction industry—Opportunities and Challenges. *Computers & Education*, 50(4), 1383-1393.
- Watson, T. (2002). Professions and Professionalism—Should We Jump Off the Bandwagon, Better to Study Where It Is Going? *International Studies of Management & Organization*, 32(2), 93-105.
- White, D., & Fortune, J. (2002). Current practice in project management—An empirical study. *International journal of project management*, 20(1), 1-11.
- Xiao, H., & Proverbs, D. (2003). Factors influencing contractor performance: an international investigation. *Engineering, Construction and Architectural Management*, 10(5), 322-332.
- Zadawa, A. N., Hussin, A. A., & Osmadi, A. (2018). Mediating Effects of Enforcement on Public Procurement Guidelines' Compliance Barriers and Cost Performance of Construction Projects in Nigerian Federal Universities: A Process Macro Approach. *Journal of Construction in Developing Countries*, 23(1), 81-102.

Tables

Table 1. Reference list showing sources of reviewed papers

Factor/variable	Source
Compliance	Gelderman et al. (2006), Eyaa & Oluka (2011), Mwakibinga & Buvik (2013), Agaba & Shipman (2007), Basheka & Sabiiti (2011), Golden & Picci (2006), Kulp et al (2006), Obanda (2010), Sutinen & Kuperan (1999), Fleisher (1991), Kauppi & Van Raaij (2015), Rokkan & Buvik (2008 & 2003), Rutherford, Buchholtz & Brown (2007), Tukamuhabwa (2012), Shu Hui et al (2011), Migosi, Ombki & Evusa (2013), Peprah (2015), Osei-Tutu et al. (2011), Boer & Telgen (1998), Zadawa et al. (2015), Karjalainen, Kempainen & Van Raaij (2009), Payan & McFarland (2005), Keith, Jackson Jr & Crosby (1990), Venkatesh, Kohli & Zaltman (1995), Zubcic & Sims (2011), Adusei & Awunyo-Victor (2015), Ojo & Gbadebo (2014), Kakitahi et al. (2015), Chan & Owusu (2017), Shan et al, (2016), Owusu et al (2017).
Familiarity	Gelderman et al, (2006), Eyaa & Oluka (2011), Mwakibinga & Buvik (2013), Migosi, Ombki & Evusa (2013), Peprah (2015), Boer & Telgen (1998), Zadawa et al (2015), Adusei & Awunyo-Victor (2015). Obanda (2010), Tukamuhabwa (2012),
Monitoring activities	Rendon (20010), Kakwezi & Nyeko (2010), Bartle & Korosec (2003), Agaba & Shipman (2007), Iyer & Jha (2005), Jacobson & Ok choi (2008), Ntayi, Rooks, Eyaa & Qian (2010), Tabish & Jha (2015 & 2011), Kingsford & Chan 2018, Ameyaw et al 2017.
Professionalism	Eyaa & Oluka (2011), Mwakibinga & Buvik (2013), Agaba & Shipman (2007), Obanda (2010), Kaupi & Van Raaij (2015), Bartle & Korosec (2003), Tukamuhabwa (2012),

	Migosi, Ombki & Evusa (2013), Osei-Tutu et al (2011), Boer & Telgen (1998), Basheka & Mugabira (2008). Shu Hui et al (2011), Ntayi & Eyaa (2010), Ntayi et al. (2009), Peprah (2015), Zadawa et al (2015), Kakitahi et al. (2015), Kalubanga, Kakwezi & Kaise (2013), Ntayi, Rooks, Eyaa & Qian (2010), Thai (2008), Duperouzel (2003), Ntayi, Byabashaija, Eyaa, Ngoma & Muliira (2010), You (2005), Karjalainen, Kempainen & Van Raaij (2009). Owusu & Chan (2017), le et al 2014, Zhang et al 2016, Kingsford & Chan (2018), Ameyaw et al(2017), Chan & Owusu (2017), Tayeh et al. (2018), Alinaitwe et al. (2007).
Sanction	Eyaa & Oluka (2011), Mwakibinga & Buvik (2013), Gelderman et al. (2010), Agaba & Shipman (2007), Rokkan & Buvik (2008 & 2003), Rutherford, Buchholtz & Brown (2007), Payan & McFarland (2005), Keith, Jackson Jr & Crosby (1990), Zubicic & Sims (2011), Ameyaw et al 2017, Chan & Owusu (2017).
Perceived inefficiency	Gelderman et al. (2006), Boer & Telgen (1998), Odhiambo & Kamau (2003), PPDA Authority (2008).
Contractors' resistance	Gelderman et al. (2010 & 2006), Pachnou (2005), Braun's (2003), Ntayi et al. (2010), PPDA Authority (2009).
Project success	Neeraj Jha & Misra (2007), Chan & Chan (2004), Chan (2001), Atkinson (1999), Lim & Mohamed (1999), Mbabazi et al. (2015), Alinaitwe, Mwakali & Hansson (2007), Enshassi, Mohamed & Abushaban (2009), Ntayi, Rooks, Eyaa & Qian (2010), Kakwezi & Nyeko (2010), Basheka & Mugabira (2008). Atkinson (1999), Tabish & Jha (2015 & 2011), Dvir & Lechler (2004), Pinto & Mantel (1990), Bartle & Korosec (2003), Agaba & Shipman (2007), Rendon (20010), Iyer & Jha (2005), Jacobson & Ok choi (2008), Ameyaw et al 2017.

Table 2. Reliability, Average Variance Extracted (AVE) and Collinearity (VIF) Results

Variable	Composite Reliability (ρ_c)	AVE	VIF
Familiarity	0.792	0.560	1.348
Monitoring activities	0.830	0.555	1.465
Professionalism	0.838	0.509	1.617
Sanctions	0.798	0.576	1.572
perceived inefficiency	0.817	0.599	1.616

Contractors' Resistance	0.802	0.670	1.298
Compliance	0.840	0.572	1.387
Project Success	0.865	0.683	

Table 3. Outer loadings

Indicators	Compliance	Contractors' resistance	Familiarity	Monitoring	Perceived inefficiency	Professionalism	Sanctions	Project success
CP1	0.895							
CP10	0.727							
CP2	0.663							
CP3	0.719							
CR1		0.856						
CR2		0.779						
F1			0.746					
F13			0.675					
F3			0.818					
M13				0.597				
M14				0.858				
M15				0.820				
M4				0.675				
PI1					0.730			
PI2					0.845			
PI3					0.742			
PR18						0.682		
PR19						0.686		
PR20						0.714		
PR21						0.791		
PR3						0.690		
S7							0.812	
S8							0.862	
S9							0.569	
PS1								0.728
PS2								0.883
PS3								0.858

Table 4. Heterotrait-Monotrait Ratio (HTMT)

Variable	Compliance	Contractors' resistance	Familiarity	Monitoring	Perceived inefficiency	Professionalism	Sanctions	Project success
Compliance								
Contractors' resistance	0.378							
Familiarity	0.195	0.501						

Monitoring	0.180	0.460	0.524					
Perceived inefficiency	0.555	0.602	0.451	0.249				
Professionalism	0.140	0.518	0.650	0.691	0.340			
Sanctions	0.572	0.453	0,381	0.389	0.769	0.335		
Project success	0.305	0.671	0.677	0.761	0.512	0.770	0.410	

Table 5. Normality Statistics for skewness and Kurtosis results

	Familiarity with PPRF	Monitoring Activities	Professionalism	Sanctions	Perceived inefficiency	Contractors' Resistance	Compliance with PPRF	Project Success
N Valid	192	192	192	192	192	192	192	192
Missing	0	0	0	0	0	0	0	0
Mean	3.5874	3.5592	3.5187	3.4544	2.9427	3.7161	3.2054	3.3611
Std. Error of Mean	.03857	.04110	.03191	.03804	.07091	.05972	.05050	.07012
Std. Deviation	.53441	.56945	.44215	.52716	.98249	.82747	.69980	.97158
Skewness	-.345	-.545	-.063	.086	-.018	-.699	.069	-.509
Std. Error of Skewness	.175	.175	.175	.175	.175	.175	.175	.175
Kurtosis	-.333	.973	.277	-.328	-.331	.266	-.619	-.407
Std. Error of Kurtosis	.349	.349	.349	.349	.349	.349	.349	.349

Table 6. Path coefficients, R² and Standardized Root Mean square Residual (SRMR)

Relationship	α	t-Statistics	P-Values
Compliance - Project success	0.147	1.960	0.050
Familiarity - Project success	0.140	2.231	0.026
Monitoring - Project success	0.314	4.875	0.000
Professionalism - Project success	0.305	4.695	0.000
Perceived inefficiency - Project success	-0.135	2.099	0.036
Contractors' resistance - Project success	0.121	1.792	0.073
Sanctions - Project success	-0.059	0.856	0.392
R ²	0.552	11.517	0.000
SRMR	0.068	13.729	0.000