

The Stakeholders' Perceptions on Critical Success Factors for Construction Projects

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Abstract

Critical success factors are those limited areas where “things must go right” for a business or organization to survive. They are described as performance measures which are crucial in making certain that a successful project is implemented and closed out in organizations. Various authors in literature have highlighted what they deem as the most important success factors for project execution, and these have been filtered out to capture the most relevant ones to the built environment industry, being: time, cost, quality, and scope and risk management. Quality is not only one of the three dimensions of the project management triangle, but also considered the ultimate, for every delivery depends on it. Project stakeholders are those individuals that have a direct or indirect effect on the success or failure of a project and have varying opinions of what constitutes as a successful project. The listed success factors above will be discussed on this paper in accordance to how the most important construction project stakeholders view those specified factors. The purpose of this research article is to investigate, assess and determine the critical success factors in construction projects and to validate their impact on the views of construction project stakeholders.

Keywords

Critical success factors, stakeholders, construction projects

1. Introduction

Corporations partake in projects because they are in the business of doing projects. They require projects to advance and grow and to conquer new markets; therefore, ensuring the successful implementation and execution of projects becomes a primary objective of any company looking for growth and development.

The organizational project manager is characterized by the role of overseeing construction planning, implementation, and close-out. He is required to possess knowledge related to components required for ensuring project success. He needs tools that will assist him in focusing his attention on set priorities across different project elements.

Critical success factors are currently used as tools in measuring project success, however the crucial question in practice is the way in which to establish project success. Projects are generally considered as successful when they are concluded timely, within the allowed cost, are effective and the client is pleased with the end results. The PMBOK (2017) does not render an explanation of project success, and only stipulates the success criteria and objectives need to be defined by the project agreement.

Success by the Oxford-Dictionary (2015) is defined as the achievement of “something” wanted. Individuals associated with the project functions generally tend to view project success as a realization of set goals, therefore, for project success to be accomplished, the project objectives and criteria needs to be properly defined.

A construction project will comprise of multiple different stakeholders, each with a different opinion on causes that ensure or measure project success. A project can be viewed as successful to its end-users if it delivers according to their expectations, functionality, awe and glam, even though it goes beyond budget or exceeds the time of construction. But because of these two (2) factors (budget and time) not meeting requirements, can be regarded as unsuccessful by the other stakeholders.

Project managers habitually refer to the triple constraints of projects being period of completion, allowable cost and the agreed upon work to be executed, when referring to the critical management factors that ensure project success. Quality will be affected when these three factors are being balanced as the (PMBOK 2017) states that a high-quality project presents its deliverables on time, within the allowed cost and in accordance with the stipulated deliverables. There is extensive literature research which shows that critical success factors go far beyond managing time, cost, and scope of work only as a means of ensuring project success.

This research is aimed at unravelling factors that are considered as essential in ensuring the execution of a successful project, and to gain knowledge regarding how these factors are perceived by the project stakeholders in bringing success to a project.

Rowlinson and Cheung (2008) Revealed that the type of problems that arise during construction implementation are due to; (1) the project manager not understanding who the project stakeholders are, (2) not engaging sufficiently with the stakeholders and (3) not understanding what the stakeholders' desires for project outputs are.

The success of a project is reliant on many different persons, therefore identifying who the relevant stakeholders are in a particular project precedes the classification and management thereof. Karlsen (2008) Stated that stakeholders possess influence in the outcome of a project being successful or not. Effectively managing the stakeholders within the built environment industry has a great contribution to the project turning out a success (EL-Naway et al. 2015).

The prevention or control of scope creep, guaranteeing that the project timelines are adhered to and project deliverables and met and that all issues that can potentially delay the project can be mitigated through proper stakeholder management (Cooper 2014). Amoatey and Hayibor (2017) Revealed that poor management of stakeholders, together with the insufficient identification of the stakeholders' needs, was viewed as being the main causes of project failure in public sector projects

1.1 Objectives

The context of this research intends on providing project managers with insights into success factors required to warrant the implementation of a successful project, and to provide knowledge of how these are viewed by different project stakeholders and the impact of the success factors related to perceptions by the stakeholders to achieve project success. Therefore, the research objectives are as follows:

- **For project managers to understand the critical factors required to ensure project success.**
- **To understand how stakeholders perceive these success factors in construction projects.**

2. Literature Review

Projects

Lester (2017) Has indicated that projects are done to attain goals compliant to detailed deliverables inclusive of time, cost and resource constraints and they could also be done to create revenue and bring in money to the investments of companies. Effective project objectives are vital to ensure successful project delivery. They assist all the relevant stakeholders and the project team in determining what the project result or outcome should be. When project characteristics are well defined before the project commences, project success becomes more likely.

Businesses that use formal methods to select projects have increased chances in achieving higher sales and profits. The study by Constantino et al. (2015) suggests that financial methods present better results regarding project selection and prioritization.

All construction activities undergo life cycle events which will differ based on their sizes and degree of complexity. The PMBOK (2017) states that the project life cycle defines: in which phase the technical tasks are to be performed;

the end date when the deliverables are to be realized; which technical team/personnel is involved in each phase and the requirements for approval. The traditional project life cycle consists of five (5) major stages, namely, project initiation, planning and design stage, execution or production stage, monitoring and controlling systems and completion or close out stage.

A project phase will generally be considered as concluded by conducting an evaluation on the activities completed to ascertain whether the milestones were acceptable and if extra work would still be required

Project management

Davis (2017) described project management as an important method and process used to successfully manage resources, associated timelines and activities. Lester (2017) Expressed that project management's purpose is to continue with activities in progress with as little disruptions or change as possible. It is possible for the right kind of project to be implemented successfully without project management; however, the presence thereof increases the likelihood for success to be achieved (Radujkovic and Sjekavica 2017).

Construction projects

In developing countries where the built environment industry is vital for creating economic value, project success is particularly important (Othman 2013), but to a large extent they fail to deliver cost-effective solutions to the client's objectives (Pica 2016). These construction projects are normally complicated due to the many activities that need to be done for the project to be completed, the different types of resources required and the management of large contract values (Bruni et al. 2011). What normally tends to happen in projects where the construction is running behind schedule due to unfavorable external environments is that the project will show overruns with respect to project schedule and over expenditure in terms of the budget and challenges in keeping to the whole aim of why the project was done and the customer's requirements may deflect over time. The explanation for construction projects' poor performance can be pointed to ailing management, unclear definition of stakeholder roles and difficulties of technology insertion in more advanced projects (Pica 2016). Yang et al. (2011) Reiterated that stakeholder management in infrastructure projects brings many challenges to project managers, because of complicated and everchanging environments.

Project stakeholders

A stakeholder could be a single person, a cluster or a company which is affected or views themselves as affected by project decisions. The main objective of developing systems and methods to identify and administer stakeholders is to reduce the number of actions that might be taken by stakeholders to hamper project success in a negative way (Karlsen et al. 2008). The project manager needs to create good relations with those stakeholders that are viewed as having the most influence in ensuring project success. A typical construction project involves various project participants such as the owner, the contractor, the sub-contractor, the designer, the consultant, and the supervisor (Wu et al. 2017). In relation to construction related projects, the internal project stakeholders comprising of the owner, project manager, design team, main contractor and end users can be viewed as the relevant stakeholders to be evaluated.

Project failure

Amoatey and Hayibor (2017) Noted that the ineffective management of stakeholders is a major cause as to why projects become unsuccessful. The cause of this failure is in the ineffective identification and management of all project stakeholders. Figure 1 below indicates reasons behind project failure as identified by (Jha and Iyer 2007).

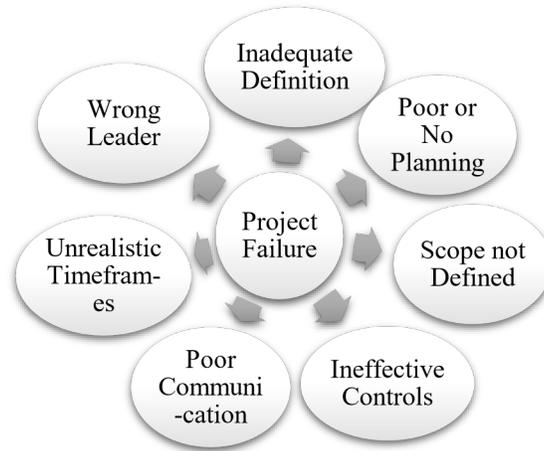


Figure 1: Project failure (Jha and Iyer 2007)

Project success

The goals and objectives of a project can be successfully realized even though the management process was a disaster. The reverse might similarly apply because a project may be impeccably accomplished, however be regarded as a total organizational failure (Rolstadas 2014). Project success entails meeting the requirements of project members and those need to be outlined before the starting of the project (Yamin and Sim 2016). Two constituents of project success are: (1) project success factors, which are the tools that guarantee success, and (2) project success criteria which are tools that measure success as can be seen on figure 2 below.

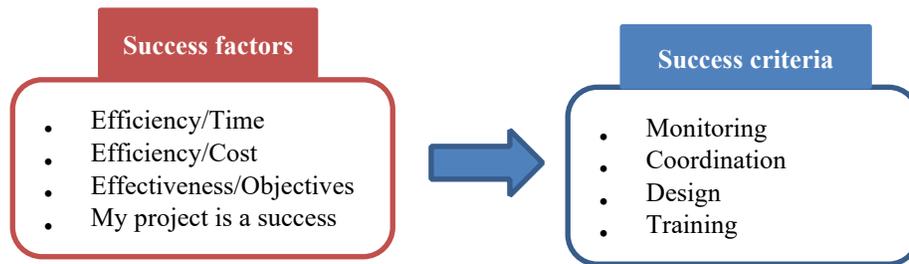


Figure 2: Conceptual Success Outline

Project success factors impacts the project environment and affects the successful realization of project goals. According to Yamin and Sim (2016), the success of projects should be measured in both objective and subjective dimensions and that success may vary at different points in the project life cycle and is dependent on stakeholder’s perspective. The objective criteria are those which are tangible and can be measured, while the subjective criteria are intangible, and they are based on a certain individual’s perspective (Jha and Iyer 2007).

Various authors have indicated what they consider as the most important tools in ensuring the success of construction projects. Delivering the project on time, at the specified cost and desired specifications is the common goal of project stakeholders (Wu et al. 2017). One of the major factors causing cost overruns in construction projects is risk (Lam and Siwingwa 2017). Project success factors encompass achieving the key success indicators of the project which include timely completion of the project, on budget completion, completion to specified quality and completion to stakeholders’ satisfaction (Molwus et al. 2017). Poor scope identification is one of the major contributors to project failure because it results in recurrent modifications and changes (Alami 2016).

Stakeholders’ views on project success

This research paper is based on the project success factors of time, cost, quality, scope, and risk management as viewed by internal stakeholders in construction projects. Project stakeholders will have varying definitions or interpretations

of what project success means. The project owner, consultants, contractors, and end-users have individual goals and benchmarks that they use to measure project success. The more stakeholders there are in a project the more complicated it can become as each will be interested in the project fulfilling his own needs and requirements which may conflict with the progress (Karlsen et al. 2008). The determination for success of the project will therefore be different to the diverse project participants.

This research paper has therefore gone into understanding who the construction industry views as relevant project stakeholders, how they can be identified, what impacts they can have on projects and what they consider as essential tools in determining whether a project was successful. Five internal project stakeholders were identified as being prevalent in construction projects and five most critical project success factors were identified from literature and the way those stakeholders perceived those factors in relation to ensuring project success was discussed.

3. Methods

The study identified the questionnaire survey as the best suited instrument to provide the required in-depth understanding of the research problem. A survey can be a measurement procedure utilized to attain data from a highly structured interview (Schindler and Cooper 2014). A Questionnaire can also refer to a sequence of questions to which the partakers are requested to answer (Rowley 2014). Research questionnaires can be circulated to potential participants either by hand, online, through emails or posts and they are designed to be filled in with no interaction with the researcher, whether physically or remotely. The benefit in conducting questionnaires is that of acquiring replies from a larger pool of individuals.

Triangulation involves using more than one source of data and method of collection to confirm the validity, credibility, and authenticity of the research data to ensure that the data is telling you what you think it is telling you (Brace 2004). For this study, only one source of data which is the survey questionnaire will be used. The member validation process involves taking or sending the research data back to participants to allow them to confirm its accuracy by permitting them to comment on and correct it to validate it. For this research, only one source of method collection will be used which is the survey questionnaire, and the questionnaire will be set up in a way that will allow participants to pause or break any time questions are misunderstood by them and later come back and refill. The member validation will not be possible as the questionnaire will allow for anonymity.

A numerical quantitative data system will be employed in the form of a Likert scale for the survey questionnaire. The idea behind a Likert-item is that the opinion will vary on the scale stem from a negative attitude “(e.g., strongly disagree or no importance)” to a positive attitude “(e.g., strongly agree or very important)” (Johns 2010). The positive scale measurement on the questionnaire will be in accordance to figure 3 below with one (1) having a weighting of strongly agree and five (5) being given to strongly disagreeing.

1. Strongly Agree	2. Agree	3. Neither agree nor disagree	4. Disagree	5. Strongly disagree
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Figure 3: Odd numbered Likert scale with median (neutral option) (Holt 2014)

The population will be selected based on the five (5) key stakeholders identified in the literature review which are the client, project manager, design team, contractors, and end-users. The target responses from the five (5) stakeholder groups are 10 respondents each, to conduct a proper weighting survey. With the goal of attaining 10 responses from the population, a larger pool of participants will be required therefore 10 will have to be a tenth of the larger population approached.

Hand delivered survey questionnaires with anonymity and consent letters highlighting choices of not participating were delivered to stakeholders that are most likely deemed to be pressed on time (PM's), unlikely to respond (clients and contractors) and those who have no access to the internet or the use of computers (end-users). Should the number of respondents be less than what the researcher would like to achieve, a cloud-based method of acquiring survey information will also be opted for. Google forms will be considered as the first option to be used to assist in attaining the number of respondents required to assist in attaining as many responses as possible from individuals who are also in the built environment industry and are part of the five (5) identified stakeholder groups.

The preferred research method for this paper was a qualitative research method based on a questionnaire survey as a tool to gather information from the five construction stakeholder types identified.

4. Data Collection

Three (3) consulting engineering companies were approached by the author in pursuit of an approval to conduct research within their companies, mostly targeted at their design teams, project managers, and even support staff who were seen more as beneficiaries for any construction project going on around them. Only one (1) response was received. The company that responded had at the time the survey was conducted ongoing construction projects, so the survey was also circulated to their contractors which some of them responded. A certain Metropolitan Municipality was also approached with regards to distributing the survey to their program managers who normally are considered as clients in construction projects but no response or approval to continue with the survey was granted. The survey was also distributed to random individuals in the construction industry and some responses were received.

The survey was distributed to over one hundred and fifty (150) participants and only thirty-six (36) responses were obtained, making the response rate only 24%. The participants are clients/ project sponsor, engineers, contractors, project managers and end-users. The confidence level for the survey is 95% for this survey and the margin of error is 5%.

5. Results and Discussion

5.1 Numerical Results

The survey was separated into Part A (general information) and Part B (survey information).

Thirty-two (32) responses were received from participants interested in partaking in the survey, and their numbers are indicated as follows:

- Nineteen (19) responses from design teams
- Five (5) responses from project managers
- Three (3) responses from contractors
- Three (3) responses from clients, and
- Two (2) responses from end-users

The summary of the highest statistics of Part A is as follows:

- Q1 – 60% of respondents are 30-39 years of age.
- Q2 – 64% of respondents have B-Tech degrees or university degrees.
- Q3 – 64% of respondents are in private engineering consultancy.
- Q4 – 59% of respondents are the design team type of stakeholders.

5.2 Graphical Results

Part B comprised of asking questions gathered from the literature review based on the relevance of the critical success factors in construction projects and whether the identified stakeholders were considered essential to the success of projects.

The respondents were asked if they believed time, cost, quality, risk, and scope management had an impact on the outcome of a successful project, and figure 4 below is a summary of the findings. The respondents strongly agreed that quality management had the strongest impact on the success of a project and were less so agreeable that scope management had an impact.

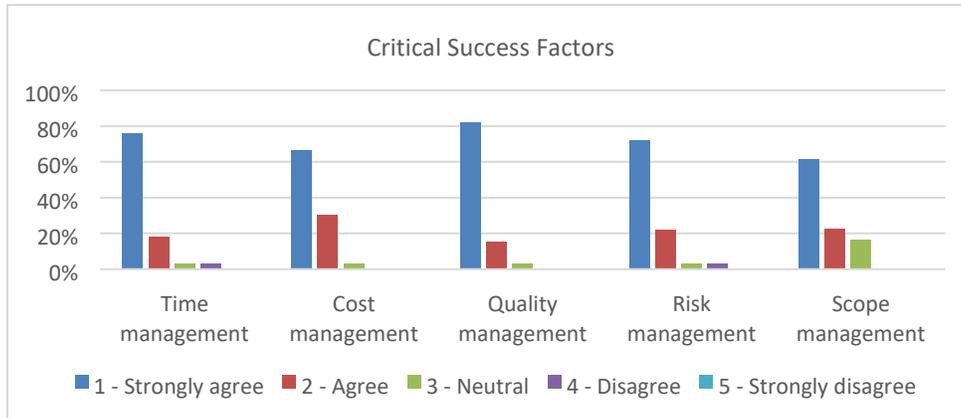


Figure 4: Critical success factors

Questionnaire surveys are popular within Construction Management Research (CMR) and often measure perception using attitude response scales which in turn are frequently analyzed using the Relative Importance Index (RII) method especially, where the aim is to arrange variables in terms of importance, agreement, severity and so on (Holt 2014). An RII weighting scale was used to establish the ranking from most to least critical importance ranking.

The formula used for the RII is as follows: $RII = \frac{\sum W}{(N * A)}$

W = Weights given to each factor by the respondents and will range from 1 to 5

A = highest weight (i.e., 5 in this case)

N = total number of respondents

An item mean was also established which is the weighted total divided by the total number of respondents. The lowest ranking number on the RII showed the item the respondent most agreed to and the highest-ranking number showed the item least agreed to.

Table 1: Success factors order of ranking

Item	"5's"	"4's"	"3's"	"2's"	"1's"	Total respondents (N)	Weighted total	RII	Item Mean
Time management	0	1	1	6	25	33	44	0,267	1,333
Cost management	0	0	1	10	22	33	45	0,273	1,364
Quality management	0	0	1	5	27	33	40	0,242	1,212
Risk management	0	1	1	7	23	32	44	0,275	1,375
Scope management	0	0	5	7	19	31	48	0,310	1,548

The order of ranking from table 1, highest to lowest considered is as follows:

- First (1st) - Quality management
- Second (2nd) - Time management
- Third (3rd) - Cost management
- Fourth (4th) - Risk management
- Fifth (5th) - Scope management

From the research findings, it was deduced that all the critical success factors (time, cost, quality, risk, and scope) identified on the literature review were considered critical to the success of a construction project, with differing

weighting scales as to the reasons most and least affecting those success factors. Table 2 below has summarized the critical success factors in the order of ranking according to the views of the stakeholders.

Table 2: Success factors order of ranking summary

Ranking	Factors	Reasons (In the order of ranking)	Weighted total	RII
1st	Quality	1. Poor construction supervision	40	0.250
		2. Poor design coordination	44	0.275
		3. Quality disregarded by contractor to cut costs	47	0.294
		4. Selecting the lowest bidder	54	0.338
		5. Client scope change request	61	0.381
2nd	Time	1. Lack of or late information	51	0.309
		2. Severe weather conditions	60	0.364
		3. Excessive government procedures	59	0.369
		4. Changed site conditions	64	0.400
		5. Design amendments	67	0.406
3rd	Cost	1. Inaccurate cost estimates	52	0.315
		2. Scope and design changes	53	0.321
		3. Contractors claims	57	0.345
		4. Conditions on actual development site	58	0.363
		5. Escalation	69	0.418
4th	Risk	1. Political risks	43	0.269
		2. Financial risks	49	0.306
		3. Poor coordination of designs	48	0.310
		4. Poorly skilled labourer's	53	0.331
		5. Inadequate OHS and EIA procedures	56	0.350
5th	Scope	1. Unclear scope	46	0.288
		2. Unforeseen risks	59	0.369
		3. Client change	61	0.381
		4. Insufficient stakeholder involvement	64	0.400

	5. New regulations and policies	75	0.469
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The respondents were asked to answer if they considered the stakeholders identified on the literature review important for the success of the project or not. As indicated on figure 5, the respondents strongly agreed that the project sponsor and project manager were crucial to the project and were less so agreeable that end-users were important to the success of a project.

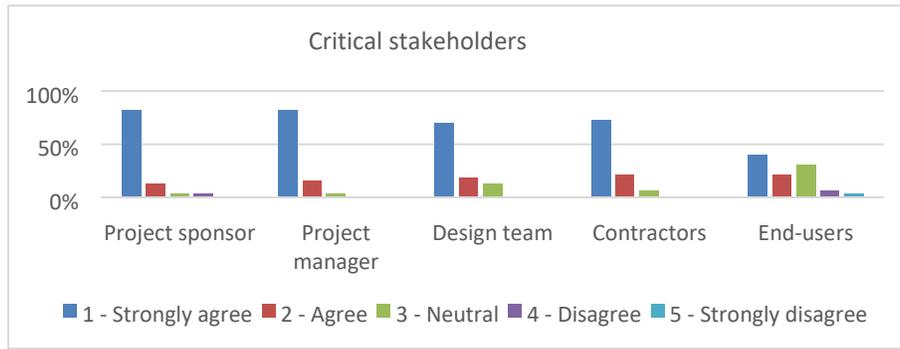


Figure 5: Critical stakeholders in construction projects

Table 3: Stakeholders' importance order of ranking

Item	"5's"	"4's"	"3's"	"2's"	"1's"	Total respondents (N)	Weighted total	RII	Item Mean
Project Sponsor/Owner	0	1	1	4	27	33	42	0,255	1,273
Project manager	0	0	1	5	27	33	40	0,242	1,212
Design team	0	0	4	6	23	33	47	0,285	1,424
Contractors	0	0	2	7	24	33	44	0,267	1,333
End users/ Beneficiaries	1	2	10	7	13	33	70	0,424	2,121

The order of ranking from table 3, highest to lowest considered is as follows:

- First (1st) - Project manager
- Second (2nd) - Project sponsor/ owner
- Third (3rd) - Contractors
- Fourth (4th) - Design team
- Fifth (5th) - End-users/ beneficiaries

5.3 Validation

The summary of Part B is as follows:

Critical success factors analysis

All factors presented (time, cost, quality, risks, and scope) were considered crucial to the success of a project with quality being considered the most important factor and scope being considered the least important factor.

Critical stakeholder analysis

All the presented stakeholders (client, project manager, design team, contractor, and beneficiaries) were considered being important with the project manager being considered the most important and the beneficiaries being considered the least important.

Time management analysis

Not all the reasons presented were considered critical in affecting time management. Late or lack of information were considered important and design amendments and changed site conditions were not seen as reasons that could detrimentally affect the time management of a project.

Cost management analysis

Not all the reasons presented were considered critical in affecting cost management. Inaccurate cost estimates were considered critical to cost management and escalation was not seen as having severe effects on the management of costing of a construction project.

Quality management analysis

Not all the reasons presented were considered critical in affecting quality management. Poor construction supervision was considered the biggest threat to the quality management of a project and the change of a client was considered the least threat.

Risk management analysis

Not all the reasons presented were considered critical in affecting risk management. Political threats were considered the biggest risk in construction projects and inadequate Occupational Health and Safety (OHS) and Environmental Impact Assessments (EIA) procedures were deemed the least threat.

Scope creep management analysis

Not all the reasons presented were considered critical in affecting scope creep management. Unclear scope was considered the top reason to affect construction projects and new regulations and policies were considered as the least reasons.

6. Conclusion

It has been determined under the literature review that projects are endeavors undertaken to attain goals compliant to deliverables of organizations by performing certain functions over a certain period. Project success entails meeting the requirement of project members. A connection exists between success factors and project success. Project success factors are tools that can be utilized to boost the successful implementation of a project. From the research findings, it was deduced that all the critical success factors (time, cost, quality, risk, and scope) identified on the literature review were considered critical to the success of a construction project, with differing weighting scales as to the reasons most and least affecting those success factors

The purpose of identifying stakeholders in projects is to reduce the number of actions that might be taken by stakeholders to hamper projects in any negative way. Stakeholders are those people that depend on the project to be successful to realize their own objectives and the project also depends on them for it to be a success. Projects comprise of internal and external stakeholders who can be categorized as neutral, uninvolved, flexible, difficult, risky, or decisive. According to the literature review, the internal stakeholders comprising of the owner, project manager, design team, main contractor and end-users can be viewed as relevant stakeholders in construction projects.

The first objective of the research was **for project managers to understand the critical factors required to ensure project success**. The critical success factors were researched, discussed, and listed in the order of ranking from the most important to the least. This is intended to help project managers in ensuring that producing a quality project is seen as the most important factor in any project, followed by adhering to project time frames, then keeping to the budget, managing the risks, and ensuring that there is no scope creep.

The second objective was **to understand how stakeholders perceive these success factors in construction projects**. The aim of this research was to also identify the most important stakeholders in construction projects and to determine how the critical success factors impact their views on project success. The study went into detail regarding how construction project stakeholders being the owner, project managers, design team, contractors and end-uses viewed

the five critical success factors listed above and how they were individual impacted by these factors. A survey questionnaire was developed and distributed to the different stakeholders, and their opinions regarding the critical success factors were tabled.

Based on the findings of the study, a project manager who seeks to ensure that a successful project is implemented fully and to the satisfaction of all the stakeholders involved, the following measures must be undertaken:

- Identify the critical success factors of that project and how they affect the project.
- Noting the importance of quality in construction projects.
- Identify the important stakeholders and effectively managing them.
- Gain an understanding of which success criteria are important to the stakeholders involved for them to gain a feeling of satisfaction at project close-out.

References

- Alami, M., *Why do information Technology Projects Fail?* (online) Available at: <https://doi.org.ddu.libdatabase.idm.ock.org/10.1016/j.procs.2016.09.123>, 15th September 2018, 2016
- Amoatey, C., and Hayivor, M. V., Critical success factors for local government project stakeholder management, *Built Environment Project and Asset Management*, Vol 7, No. 2, pp. 143-156, 2017
- Brace, I., *Questionnaire Design, How to Plan, Structure and Write Survey Material for Effective Market Research*, United Kingdom, Kogan Page, 2004
- Bruni, M. E., Beraldi, P., Guerriero, F., and Pinto, E., A scheduling methodology for dealing with uncertainty in construction projects, *Engineering Computations*, Vol. 28, No. 8, pp. 1068-1078, 2011
- Constantino, F., Di Gravio, G. and Nonino, F., Project selection in project portfolio management: An artificial neural network model based on critical success factors. *International Journal of Project Management*, 33(8), pp. 1744-1754, 2015
- Cooper, B., *Corporate Education Group: What You Must Know about Stakeholder Management*, 2014
- Davis, K., An empirical investigation into different stakeholder groups perception of project success, *International Journal of Project Management*, pp. 604-617, 2017
- El-Naway, O., Mahdi, I., Badwy, M., and Al-deen, A., Developing methodology for stakeholder management to achieve project success, *International Journal of Innovative Research in Science, Engineering and Technology*, Vol. 4, No. 11, 2015
- Holt, G. D., Asking questions, analysing answers: relative importance revisited, *Construction Innovation*, Vol. 14, No. 1, 2014
- Jha, K. N., and Iyer, K. C., Commitment, coordination, competence and the iron triangle, *International Journal of Project Management*, Vol. 25, No. 5, pp. 527-540, 2007
- Johns, R., (2010), Likert items and scales, (Online), Available at <https://surveynet.ac.uk/sqb/datacollection/likertfactssheet.pdf>, Accessed 25th August 2020, 2010
- Karlsen, J., Graee, K. and Massaoud, M. J., Building Trust in Project Stakeholder Relationships, *Baltic Journal of Management*, Vol. 3, no. 1, pp. 7-22, 2008
- Lam, T. Y., and Siwingwa, N., Risk management and contingency sum of construction projects, *Journal of Financial Management of Property and Construction*, Vol. 22, No. 3, pp. 237-251, 2017
- Lester, A., Chapter 1 – Project Definition, *Project Management, Planning and Control*, Vol. 7, pp. 1-5, 2017
- Molwus, J. J., Erdogan, B., and Ogunlana, S., Using structural equation modelling to understand the relationship among critical success factors (CSFs) for stakeholder management in construction, *Engineering, Construction and Architectural*, Vol. 24, No. 3, 2017
- Othman, A., Challenges of mega construction projects in developing countries, *Organisation Technical and Management in Construction, an International Journal*, 2013
- Oxford-Dictionary., *Oxford Dictionary* (online) available at: <https://en.oxforddictionaries.com/>, 20th June 2018, 2015
- Pica, M., *Project Life Cycle Economics*, 2nd Edition. New York, Routledge, 2016
- PMBOK., A guide to the Project Management Body of Knowledge, *Project Management Institute*, 6th Edition, Newtown Square, Pennsylvania, 2017
- Radujkovic, M. and Sjekavica, M., Project Management Success Factors, *Creative Construction Conference*, Vol. 196, pp. 607-615, 2017
- Rolstadas, A., Tommelein, I., Schiefloe, P. M and Ballard, G., Understanding Project Success Through Analysis of Project Management Approach, *International Journal of Managing Projects in Business*, Vol. 7, No. 4, pp. 638660, 2014

- Rowley, J., Designing and Using Research Questionnaires, *Management Research Review*, Vol. 37, No. 3, pp 308330, 2014
- Rowlinson, S. and Cheung, Y. K., Stakeholder management through empowerment modelling project success, *Construction Management and Economics*, Vol. 26, No. 6, pp 611-623, 2008
- Schindler, P. and Cooper, D., Business Research methods, 12th Ed. New York, McGraw-Hill/Irwin, 2014
- Yamin, M. and Sim, A., Critical Success Factors for International Development Projects in Maldives: Project Teams Perspective, *International Journal of Managing Projects in Business*, Vol. 9, No. 3, pp. 481-504, 2016
- Yang, J., Shen, Q., and Ho, M., Stakeholder management in construction: an empirical study to address research gaps in previous studies, *International Journal of Civil Engineering and Management*, Vol. 15, No. 4, pp. 337341, 2011
- Wu, Z., Nisar, T., Kapletia, D., and Prabhakar, G., Risk factors for project success in the Chinese construction industry, *Journal of Manufacturing Technology Management*, Vol. 28, No. 7, pp. 850-866, 2017

Biographies

Gomolemo Lovell Phetlhu is an experienced Project Manager at Seco Construction and Project Managers, a Director at Maximum Impact Engineering Solutions and Torong Consult and on the board of Associates at SLS Engineering. She is a Civil Engineering Technologist professionally registered with the Engineering Council of South Africa, currently enrolled in the master's degree program focused on Engineering Management from University of Johannesburg and has demonstrated a history of working in engineering consulting industry. She is skilled in the management of complex civil infrastructure projects from conceptualization, design, contract management, quality assurance and compliance and ensuring proper integration with all the disciplines to the client's overall plan; program management, portfolio management and financial monitoring to ensure effective and efficient function of the organization within the budgetary constraints of clients

Dr. Hannelie Nel holds a Doctorate in Engineering Management, a Master of Science Degree in Industrial Engineering and a bachelor's degree in Chemical Engineering. She has over twenty years' experience in both industry and academia and is a registered Professional Engineer with the Engineering Council of South Africa. Hannelie is a former President of the Southern African Institute for Industrial Engineering (SAIIE) and serves on the Board of Denel SOC as Non-Executive Director. She is an international author and speaker and has published three books and over forty technical academic papers and chapters to date. She is an associate member of the Institute of Directors of South Africa. She was twice nominated for the prestigious SAIIE Kris Adendorff Award for outstanding Industrial Engineering professional and awarded Honorary Membership of the SAIIE in 2018. In 2014 she was elected as Finalist in the Standard Bank Top Businesswomen Awards; and invited as member of the IWF for her contribution to leadership and development of technical women. Hannelie supervises master's students and Doctoral candidates in Engineering Management, where she serves as a postgraduate supervisor for the University of Johannesburg.