

# Learning from Existing Errors: External Stakeholders' Impact on Road Infrastructure Projects

Opeoluwa Akinradewo<sup>1</sup>, Winnie Mushatu<sup>2</sup>,  
Nokulunga Mashwama<sup>2</sup>, Clinton Aigbavboa<sup>1</sup>,  
and Didibhuku Thwala<sup>3</sup>

<sup>1</sup>cidb Centre of Excellence, Faculty of Engineering and the Built Environment,  
University of Johannesburg, South Africa

<sup>2</sup>Department of Construction Management and Quantity Surveying, Faculty of  
Engineering and the Built Environment, University of Johannesburg, South Africa

<sup>3</sup>Department of Civil Engineering, College of Engineering, Science and Technology,  
University of South Africa, South Africa

## ABSTRACT

Road infrastructure improves a country's economy through the transportation of goods and resources while providing access to various facilities. To attain success on road construction projects, it is essential to engage the external stakeholders involved to avoid controversies and conflicts at the project's execution phase. This study is aimed at evaluating the impact of stakeholders on the successful execution of road projects. The paper adopted a quantitative approach in investigating external stakeholders' impact on a road construction project in South Africa. Data for this study was collected using both primary and secondary sources. A 76% rate of retrieval was achieved using a questionnaire survey, and they were found suitable for analysis. The use of factor analysis in data analysis aided in reducing the large set of factors to four clusters. According to the findings, community unrest was at the forefront, followed by slow responses from existing service providers; project delays; poor relationships among service providers; a negative attitude toward the project; regular changes in local authority rules, regulations, and protocol; and resistance to relocating property. According to the findings, stakeholder involvement encourages the general people to share information with regulatory bodies. This will assist authorities in making better-informed decisions, thereby reducing the possibility of project failure. This study will be useful to construction professionals in enhancing the successful completion of road projects while knowing when to involve external stakeholders for smooth running of road construction projects in developing countries.

**Keywords:** Collaboration, Construction, Infrastructure, Performance, Project stakeholder

## INTRODUCTION

Construction projects have been reported to be complex in nature as all projects are never the same even if they are similar (Aljohani, Ahiaga and Moore, 2017). The industry provides vital infrastructures for economic development of a country (Mahamid *et al.*, 2012). Infrastructure such as roads,

bridges, tunnels, rails, airport, telephone lines, cell phone towers, dams and reservoirs, canals, fire stations, hospitals, clinics, schools, post offices, schools, public parks improve the condition of living for citizens of a country whilst contributing to the economy of many countries. Roads make living life easier in countless ways as they serve as links between provinces and connect countries. Road infrastructure improves a country's economy through the transportation of mineral resources in mining, agricultural products, among others while providing access to various facilities such as workplaces, schools, shopping centres, hospitals, and recreation centres (Mashwama, Mushatu and Aigbavboa, 2018a). If roads are in a good condition, they reduce travel times, save on fuel for vehicles, and reduce production costs for the ever-growing number of goods shipments. In general, roads boost the country's economy and simplify people's lives (Akinradewo, Aigbavboa, Oke and Coffie, 2021; Levinson, 2004).

According to Takim (2009), stakeholders can be referred to as "people or groups that have, or believe they have, legitimate claims against the substantive aspects of a project. These can include the team's families, people who buy the product or are affected by the product and the local community at large". Due to the fragmentation caused by complexity of the construction industry, a major challenge encountered is the collaboration of these stakeholders (Malkat and Byung, 2012). Stakeholders on a road construction project can be classified into external and internal stakeholders. Internal stakeholders are mostly in support of the road construction project at hand, however, the same cannot be said of external stakeholders (Nguyen, Chileshe and Rameezdeen, 2018). This can be attributed to mismanagement and miscommunication of project impacts on the external stakeholders which sometimes result in conflict (Caputo, 2013). Therefore, it is vital to investigate the impact of external stakeholders on the road construction into consideration for modernising quality roads in developing countries. This study is aimed at evaluating the impact of external stakeholders on the successful execution of road projects.

## **STAKEHOLDERS ON THE ROAD PROJECTS**

Stakeholders on a road construction project can be classified into external and internal stakeholders and also subdivided into primary, secondary and tertiary stakeholders (Chinyio and Olomolaiye; 2010). They are those individuals and organizations who engage directly in the project or whose interests might be influenced by the failure or success of a road construction project (Assefa et al., 2015). In construction, these stakeholders are clients, professional consultants, contractors, subcontractors, suppliers, financiers, local authorities, statutory organisations, communities/end users, among others. (Mashwama, Thwala and Aigbavboa, 2018b). Stakeholders who are actively engaged in the road construction project decision-making and execution are regarded as direct or primary stakeholders while indirect or secondary/external stakeholders lacks any formal involvement in the road construction project and they work independently on the project (Newcombe, 2003; Smith and Love 2004). The focus of this study is on the external stakeholders

who can be referred to as the secondary and tertiary stakeholders on road construction projects.

External stakeholders are secondary stakeholders who are mostly passive on the road construction project while undertaking decisions made by primary stakeholders and having little influence during the implementation phase of the project (Buerthey *et al.*, 2016). External stakeholders do not have any contractual relationship with the owner of the road construction project. However, they have some interests and rights on the road construction project. These stakeholders can either be private and public entities (Molwus, 2014). The external stakeholders or secondary stakeholders that this study concentrated on are the community affected by the project, the local authorities such as local municipalities together with ward councillors affected by the project, property owners that need to be compensated for their properties along the project, service providers for existing services that are disrupted by the progress of the project such as Telkom lines, Eskom cables, Rand Water or the Johannesburg water line, among others. Moreover, road users are included as external stakeholders as they have influence to encourage or stop the project owing to various reasons.

## METHODOLOGY

A two-stage approach to research was adopted for this study. This involves the review of literature which assisted in identifying the external stakeholders who has a great impact on the road construction. The second stage involves the employment of quantitative research methodology which is the use of a well-structured questionnaire. This was used to retrieve the opinion of respondents on the impact of external stakeholders on the road construction project in developing countries with South Africa as a case study. The preferred and adopted sampling method for this study was random sampling technique. This is because random sampling technique ensures that every participant has the probability of being chosen to be part of the study. The questionnaires were distributed by email and hand delivery was also made to construction companies, client and engineering firms during different site briefing for tenders and site meetings in the Gauteng Province of South Africa. The questions were designed such that target respondents ranked the identified impact factors of external stakeholders on the road construction projects using a five-point Likert scale where Strongly disagree = 1 and Strongly agree = 5. Since the questionnaire were self-administered, 76% response rate was achieved which is suitable for analysis and deemed acceptable for social research (Moser and Kalton, 2017). The retrieved data was analysed using mean item score in order to rank the identified variables in descending order. Furthermore, the responses were subjected to exploratory factor analysis (EFA). For the reliability of the collected data, Cronbach's alpha was employed and a value of 0.873 was obtained to show that there is internal consistency in the data collection instrument used for the study.

**Table 1.** External stakeholder's impact factors on road construction projects.

| Factor  | Mean | Standard Deviation | Rank |
|---|------|--------------------|------|
| Community unrest  | 4.14 | 1.071              | 1    |
| Slow response by existing service providers                           | 3.81 | 1.036              | 2    |
| Stakeholders have negative impacts in projects                        | 3.70 | 1.063              | 3    |
| Stakeholders have influence on failure of the project                 | 3.68 | 0.956              | 4    |
| Stakeholders' delay projects  | 3.66 | 1.017              | 5    |
| Inadequate channel of communication between stakeholders              | 3.66 | 1.096              | 5    |
| Stakeholders' bad relationship between each other                     | 3.52 | 1.107              | 7    |
| Lack of technical capacity on stakeholders                            | 3.48 | 1.180              | 8    |
| Stakeholders bad attitude towards project                             | 3.47 | 1.029              | 9    |
| Regular changes of local authority's rules, regulations & protocol    | 3.47 | 1.144              | 9    |
| Resistance to relocate by property owners after property compensation | 3.45 | 0.987              | 11   |
| Stakeholders' late involvement in the project                         | 3.42 | 1.166              | 12   |
| Stakeholders' low enthusiasm  | 3.23 | 1.149              | 13   |
| Lack of time to participate on project by stakeholders                | 3.18 | 1.135              | 14   |

## RESULTS AND DISCUSSION

From the analysis of data retrieved, 26% of the respondents are quantity surveyors, 29% are construction managers, and 45% are engineers handling road projects within the Gauteng province of South Africa. All these professionals have a minimum of five (5) years of experience on road projects across South Africa. Based on these findings, it can be deduced that the respondents possess adequate knowledge to provide reasonable answers to the questionnaire for this study.

### Descriptive Analysis Result

Based on the opinion of the respondents, Table 1 indicated that community unrest ( $M = 4.14$ ;  $SD = 1.071$ ) took presidency on the list of external stakeholder's impact towards construction road projects followed by the slow response by existing service providers with ( $M = 3.81$ ;  $SD = 1.036$ ). Stakeholders have negative impacts in projects was ranked 3<sup>rd</sup> with ( $M = 3.70$ ;  $SD = 1.063$ ). At the bottom of the ranking, Stakeholders late involvement in the project was ranked 12<sup>th</sup> with ( $M = 3.42$ ;  $SD = 1.166$ ); Stakeholders low enthusiasm was ranked 13<sup>th</sup> with ( $M = 3.23$ ;  $SD = 1.149$ ); Lastly, the Lack of time to participate on project by stakeholders was ranked last with ( $M = 3.18$ ;  $SD = 1.135$ ).

### Exploratory Factor Analysis Result

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were conducted on the data to ascertain its suitability for EFA. The KMO measure of sampling adequacy returned a value of 0.804

**Table 2.** Rotated factor matrix of external stakeholders' impact.

| Factor  | 1     | 2     | 3     | 4     |
|---|-------|-------|-------|-------|
| Stakeholders have negative impact on projects   | 0.830 |       |       |       |
| Stakeholders delay projects   | 0.738 |       |       |       |
| Stakeholders have influence on failure of the project   | 0.673 |       |       |       |
| Stakeholders bad attitude towards projects  | 0.548 |       |       |       |
| Regular changes of local authority's rules regulations & protocol   |       | 0.739 |       |       |
| Stakeholders' late involvement in the project   |       | 0.679 |       |       |
| Slow response by existing service providers   |       | 0.624 |       |       |
| Resistance to relocate by property owners after property compensation   |       | 0.581 |       |       |
| Stakeholders' bad relationship between each other   |       |       | 0.812 |       |
| Stakeholders' low enthusiasm  |       |       | 0.755 |       |
| Community unrest  |       |       |       | 0.552 |
| Inadequate channel of communication between stakeholders  |       |       |       | 0.543 |
| Lack of time to participate on project by stakeholders  |       |       |       | 0.508 |
| Lack of technical capacity on stakeholders  |       |       |       | 0.441 |
| Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalisation. <sup>a</sup> |       |       |       |       |

a. Rotation converged in 9 iterations.

which is above the prescribed value of 0.6, while Bartlett's test of sphericity returned a significant value of 0.000 which is below 0.5 as prescribed. This is considered sufficient to conduct a factor analysis as any value above 0.6 is considered acceptable. The p-value of Bartlett's test of sphericity (represented by "Sig"), indicates a measure of the multivariate normality of the set of distributions. According to George and Mallery (2003), a significant value <0.05 indicates that the data does not produce an identity matrix and are thus acceptable for factor analysis. The total variance of the external stakeholder's impact of performance in roads infrastructure projects revealed four components which had eigen value of above 1 namely (5.393; 1.652; 1.343 and 1.222). The components eigen value defined the 38.52%; 11.80%; 9.59% and 8.73 % respectively of the variance which indicates 68.65 % of the total variance of the data set. This satisfies the cumulative proportion of variance criterion which states that the extracted components should together be 50% of the variation (Kissi et al 2016). Therefore, the four factor groupings can be used to adequately represent data. The study adopted factor grouping based on PCA, varimax rotation. Table 2 presents the rotated factor matrix which highlights how the factors have been clustered together. The table shows that the exploratory factor analysis returned four components and also revealed the arrangement of all the variables under each returned component according to their significance. After a critical study of table 2, a common name for each clustered factor was decided.

Component 1: External Stakeholder's Behaviour Towards Construction Projects. The component 1 encountered 38.518% of the total variance of the external stakeholder's impact in road infrastructure projects which was valid. Component 1 suggests that stakeholder's behaviour towards construction

projects determined the success or failure of the project. The external stakeholder's attitude, negative impact, lack of technical capacity on stakeholders and the unrest of the community contributed considerably on roads projects. Community unrest causes confusion regarding the completion date of the project by the contractor. External stakeholders are regarded as secondary stakeholders without a contractual contract with the owner of the project; however, they have a massive impact on project. Stakeholder management is a key role on projects. Based on the submission of Aaltonen, Jaakko and Tuomas (2008) which was further expressed by Nguyen, Chileshe and Rameezdeen (2018), a project can be pressurized by stakeholders in situations whereby they are in control of inputs that are important to the project. These inputs are not limited to capital, material or labour but also include the location of site, permits from local authorities (Project Management Institute, 2016).

**Component 2: Third Party's Involvement as a Stakeholder.** The component 2 encountered 11.803% of the total variance of the external stakeholder's impact on road infrastructure projects which was valid. Component 2 is suggesting that the involvement of the third parties on a project causes a delay on projects. Component 2 highlighted the third parties such as service providers of existing services, local authorities affected by the project, and property owners that need to relocate. Service providers of existing services seem to forget to relocate existing services during the construction of the project as they take their time to do so. Furthermore, property owners tend to resist relocation owing to poor compensation and undervalued market price for their property. As submitted by Takim (2009), most clients are used to dealing with internal stakeholders on their projects forgetting the surrounding communities and end-users who are third parties and also stakeholders on the project.

**Component 3: Stakeholder's Poor Communication Among Each Other.** Component 3 encountered 9.595% of the total variance of the external stakeholder's impact on road infrastructure projects which was valid. Component 3 is suggesting that stakeholders should have good effective communication among each other and have high enthusiasm for a project. According to Hendry (2005) and Nguyen, Chileshe and Rameezdeen (2018), the communication strategy adopted by external stakeholders is expected to bring about blockades, protests, report production and resolution which helps in attracting the attention of potential allies.

**Component 4: Stakeholder's Dedication to the Project.** Component 4 encountered 8.730% of the total variance of the external stakeholder's impact on road infrastructure projects which became valid. Component 4 is suggesting that stakeholders must be always dedicated to the project by having time to participate on project, communicate with other stakeholders, keep informed and be part of decision making. Effective communication is the way to go. This was supported by Malkat and Byung (2012) who opined that the decision-making process on road construction projects require stakeholders to be dedicated to the project most especially the major activities on daily basis. This is because stakeholders have direct impact on the project.

## CONCLUSION

This study has been able to evaluate the influence of stakeholders on the success or failure of road construction projects. The study carried out extensive literature review to draw information from body of knowledge before employing quantitative research method to evaluate the opinion of respondents within the study area. Descriptive analysis was conducted on the retrieved data while EFA followed. The variables were rated using mean item score and further clustered in a more understandable and manageable groups. The findings revealed that the stakeholders on road construction projects affect the project in a positive or negative way depending on stakeholder's attitude towards the project. External stakeholders affect the project through community unrest, slow response by existing service providers, among others. Also, external stakeholders have negative impact on road projects, and they can influence the failure of the project. Due to the close variance recognised, the following labels were given to the four groups: external stakeholder's behaviour toward construction project; third party's involvement as a stakeholder; stakeholder's poor communication among each other; and stakeholder's dedication to the project. Based on the following findings, it is recommended that stakeholders' involvement should be a priority in roads construction project to influence the successful completion of road projects within the stipulated period thereby saving cost in the process. The participation of stakeholders will encourage the sharing of knowledge with the regulatory authorities by the general public. This assists the authorities in making better-informed decisions thereby reducing the possibility of project failure. This study will be useful to construction professional in enhancing the successful completion of road project while knowing when to involve external stakeholders for smooth running of roads construction project in developing countries. The study was limited to Gauteng province in South Africa due to the numerous road construction projects being carried out in the province. However, a further study can be done focusing on other provinces to have a nationwide view of respondents on the subject matter.

## REFERENCES

- Aaltonen, K., Jaakko, K., Tuomas, O. (2008). Stakeholder Saliency in Global Projects. *International Journal of Project Management*, 26(5), 509–516.
- Akinradewo, O., Aigbavboa, C., Oke, A., Coffie H. (2021). "Modelling A Cost Profile for Road Projects", *Canadian Journal of Civil Engineering*, 48(4), 366–376. <https://doi.org/10.1139/cjce-2019-0739>
- Aljohani, A., Ahiaga-Dagbui, D., Moore, D. (2017). Construction Projects Cost Overrun: What Does the Literature Tell Us? *International Journal of Innovation, Management and Technology*, 8(2). 137–143
- Assefa, F, Worke, Z.T., Mohammed, M. (2015). Stakeholders Impact Analysis on Road Construction Project Management in Ethiopia: A Case of Western Region, *International Journal of Engineering and Technical Research*, 3(11), 115–121.
- Buerter, I.T., Amota, D., Atsrin, F. (2016). Stakeholder Management on Construction Projects: A Key Indicator for Project Success, *American Journal of Civil Engineering*, 4(4), 117–126.

- Caputo, A. (2013). Systemic Stakeholders' Management for Real Estate Development Projects. *Global Business and Management Research: An International Journal*, 5, 66–82.
- Chinyio, E., Olomolaiye, P. (2010), *Construction Stakeholder Management*, Chichester Wiley.
- Cleland, D.I., (1999). *Project Management – Strategic Design and Implementation* (5th Edition) Available Online At <http://protege.stanford.edu/>.
- Hendry, J. R. (2005). Stakeholder Influence Strategies: An Empirical Exploration. *Journal of Business Ethics*, 61(1), 79–99.
- Kissi, E, Boateng, E.B, Adjei-Kumi, T, Badu, E. (2016). Principal Component Analysis of Challenges Facing the Implementation of Value Engineering in Public Project in Developing Countries. *International Journal of Construction Management*.
- Levinson, H.S., (2004). Highways, People and Places: Past, Present and Future. *Journal of Transportation Engineering*, 130(4) 406–411.
- Mahamid, I., Bruland, A., Dmaidi, N., (2012). Causes of Delay in Road Construction Projects. *Journal of Management in Engineering*, 300–310.
- Malkat, M., Byung-Gyoo, K. (2012). An Investigation on The Stakeholders of Construction Projects in Dubai And Adjacent Regions. *International Proceedings of Economics Development and Research*, 45(1), 77–84.
- Mashwama, N, X., Mushatu, W.S. Aigbavboa, C.O. (2018a). Challenges Faced by Stakeholders in The Road Construction Projects in Gauteng Province of South Africa. *Proceeding of The Creative Construction Conference*. Ljubljana, Slovenia, 345–353.
- Mashwama, X.N., Thwala, D.W Aigbavboa, C. (2018b). Investigation of Poor Service Delivery of Road Infrastructure. *Proceedings of The International Conference on Industrial Engineering and Operations Management*, Paris, France, July 26-27, 1625- 1634.
- Molwus, J.J., (2014). “Stakeholder Management in Construction Projects: A Lifecycle-Based Framework”, Working Paper, Doctor of Philosophy in Construction, Of Heriot Watt University, Edinburgh, 1–313.
- Moser, C., Kalton, G. (2017). “Survey Methods in Social Investigation”, *The British Journal of Sociology*, 9(4). 383–396
- Project Management Institute. (2016). *Construction Extension to The PMBOK' Guide*. Project Management Institute, Newtown Square, PA.
- Newcombe, R. (2003). “From Client to Project Stakeholders: A Stakeholder Mapping Approach”. *Journal of Construction Management and Economics*, 21(8), 841–848.
- Nguyen, T. H. D., Chileshe, N., Rameezdeen, R. (2018). External Stakeholder Strategic Actions in Construction Projects: A Vietnamese Study. *Construction Management and Economics*, 36(8), 443–458.
- Takim, R. (2009). The Management of Stakeholders' Needs and Expectations in The Development of Construction Project in Malaysia. *Modern Applied Science*, 3(5), 167–175.