CHAPTER 8: CONCLUSION

8.0 Introduction
This chapter presents the conclusion of the study in several sections. The first section summarises the findings of the study in relation to the objectives. The second section discusses the managerial implications of this study while the third section provides recommendations. The fourth section highlights the limitations of the study and finally, the last section suggests future research directions.

8.1 A snapshot of summary findings
The purpose of the current study was to develop a performance evaluation framework for assessing performance amongst public sector construction projects in developing countries. In order to realise this objective, the researcher first conducted an extensive review of the relevant literature in order to identify the existing body of knowledge in the domain of performance measurement of construction projects. Based on the review, performance indicator variables and the variables that influence project success were identified and discussed with the experts in the area of construction management. The variables were refined and a survey instrument was designed. This was subsequently administered to clients, consultants and contractors who had been involved in the CDF projects in the Western province, Kenya. The demographic statistics regarding project characteristics and respondents’ profile were analysed using Chi-square test of independence and one way Analysis of Variance (ANOVA). The relevance of the performance indicator variables and success related variables amongst CDF construction projects in Kenya was established through EFA, CFA and SEM.

The study resulted in a set of KPIs that reflect the economic, social and environmental dimensions of public sector construction projects. Further, the study identified and confirmed a set of CSFs based on the KPIs which would enable the projects to achieve performance on the identified KPIs. Finally, based on the two scales, one for KPIs and the other for CSFs, a performance evaluation framework was developed. The relationships on the developed framework were hypothesised and analysed using SEM.
These ensured that all the research objectives are addressed. A snapshot of summary findings in relation to the objectives is given below.

- The occurrence of time overrun, cost overrun and quality defects does not vary on the basis of the type of CDF construction projects. All types of projects are prone to these problems pointing towards the need for other factors to be considered.

- Respondents’ experience has no relationship with the occurrence of time overrun, cost overrun and quality of defects on CDF construction projects. Most of these projects are characterised by standard procedures which guide the construction process.

- The occurrence of time overrun and quality defects on CDF construction projects does not vary with the project procurement method. However, the occurrence of cost overrun varies across different procurement approaches. This is because different procurement approaches have implications on how project costs are computed and appropriated amongst different parties who are responsible for undertaking construction.

- Project performance of CDF construction projects are evaluated on the basis of six KPIs namely project time, cost, quality, safety, site disputes and environmental impact. These KPIs address the economic, social and environmental dimensions of public sector construction projects.

- Whilst not all the KPIs are significant in terms of their relationship with project performance, there is significant evidence and support for measurement of project performance on the basis of time, cost, quality and site disputes.

- There are six CSFs that influence success of public sector construction projects: project-related factor, client-related factor, consultant-related factor, contractor-related factor, supply chain related factor and external environment-related factor.

- All these six CSFs assessed are significant, providing empirical support for considering them as factors that influence success of public sector construction projects.
The external environment related factor does not mediate the influence of the remaining CSFs on project success.

Client related and project related factors; client related and consultant related factors; and contractor related and supply chain related factors are intercorrelated.

Success of public sector construction projects has a significant positive association with overall project performance on the various KPIs. This supports inclusion of the two concepts in the performance evaluation framework for assessing performance of public sector construction projects.

These findings are briefly described in the following sections.

8.1.1 Summary findings regarding the relationship between projects’ characteristics, respondents’ profile and occurrence of time overrun, cost overrun and quality defects.

In the exploratory study, it was found that majority of the projects funded under CDF were Educational in nature followed by Health Care facilities while the number of Industrial Estates and Agricultural Markets turned out to be the same. Most of these projects were found to have been procured through the negotiated general contract approach. With regard to cost overrun, time overrun and quality defects, it was found that majority of projects got delayed but in most cases they met budgetary allocations and quality specifications. With regard to respondents’ profile, majority of the respondents were clients owing to their number in the target population, followed by contractors and then consultants. Most of these respondents were found to posses several years of experience in which they worked on relatively large projects as evidenced by the value of the projects. These findings were confirmed in the study in phase II, except that unlike in the exploratory study where the number of projects under Industrial Estates and Agriculture was the same, the number of Industrial Estates came out to be the least.

While examining the occurrence of time overrun, cost overrun and quality defects across different types of projects in Phase II, it was found that the extent of occurrence of cost overrun, time overrun and quality defects did not differ across the
different types of projects. Similarly, it was found that project procurement approach did not have any effect on the occurrence of time overrun and quality defects. However, the occurrence of cost overrun was found to be dependent on the type of project procurement approach. While examining the relationship between respondents’ experience and the incidences of time overrun, cost overrun and quality defects, the results show that respondents’ experience has no effect on the occurrence of any of the three indicators of project performance.

8.1.2 Summary findings regarding KPIs

The KPIs of overall project performance of CDF construction projects were assessed at three levels. First, based on literature review and discussion with experts, a list of 35 performance related variables (shown in table 8.1) was identified. At the second level, performance measurement variables were refined through EFA. This resulted in 27 performance variables which loaded into six dimensions of overall project performance namely time, cost, quality, safety site disputes and environmental impact as can indicated in table 8.1. The empirical findings of the study and the subsequent analyses suggest that the performance of public sector construction projects does not merely depend on the traditional internal criteria of time, cost and quality. It also depends on another internal measure, safety and two external measures namely site disputes and environmental impact. At the exploratory level, it was found that project time is the most important KPI followed by cost while safety comes last in the order of importance.

In the third step, the 27-variable six-factor of KPIs scale was further analysed using CFA. The analyses resulted in a 17-item six construct measurement scale for CDF construction projects. Test statistics of both first order and second order measurement models are acceptable for performance measurement amongst CDF construction projects. Table 8.1 summarises the findings of the three steps used in assessing KPIs.
Table 8.1: Summary of the dimensions of KPIs and performance measurement variables in both survey I and survey II

<table>
<thead>
<tr>
<th>Literature review and discussion with experts</th>
<th>Exploratory Study (Phase I)</th>
<th>Confirmatory Study (Phase II)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Performance variables)</strong></td>
<td>Dimension</td>
<td>Dimension</td>
</tr>
<tr>
<td>PV1: There has not been any increase in the cost of raw materials during construction of this project.</td>
<td>TPV1: Timely delivery of resources</td>
<td>TPV1: Timely delivery of resources</td>
</tr>
<tr>
<td>PV2: Labour costs more or less remained stable over the period of construction of the current project.</td>
<td>TPV2: Harmonious relationship on site.</td>
<td>TPV2: Harmonious relationship on site.</td>
</tr>
<tr>
<td>PV3: The project experienced minimum variations and hence hardly any additional cost attributable to variations was incurred.</td>
<td>TPV3: A clear plan was formulated.</td>
<td></td>
</tr>
<tr>
<td>PV4: The required equipments were available at pre budgeted rates.</td>
<td>TPV4: No delays in securing funds.</td>
<td></td>
</tr>
<tr>
<td>PV5: The amount/quantity of different type of resources required during the implementation phase matched with those estimated during planning stage.</td>
<td>TPV5: No effect of weather and climatic conditions.</td>
<td></td>
</tr>
<tr>
<td>PV6: There were no incidences of fraudulent practices and kickbacks during project execution.</td>
<td>TPV6: No design changes.</td>
<td></td>
</tr>
<tr>
<td>PV7: There were no incidences of agitation by the trade unions in the current project.</td>
<td>TPV7: At handover there were no apparent defects.</td>
<td></td>
</tr>
<tr>
<td>PV8: There were no serious dispute between the client and contractor due to non adherence to the specifications.</td>
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<td></td>
</tr>
<tr>
<td>PV9: Disputes were observed due to the frequent changes in the design of the current project.</td>
<td></td>
<td></td>
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<tr>
<td>PV10: Dispute resolution meetings were often held during project execution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV11: At time of project completion, there were no financial claims that remained unsettled from this project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV12: This construction project has adversely affected the quality of groundwater level.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV13: All required resources for the project were delivered on time during execution of this project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV14: A clear plan was formulated and an efficient planning and control system was designed to keep the current project up-to-date.</td>
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<td></td>
</tr>
<tr>
<td>PV15: No changes were introduced in the designs of the current during project execution.</td>
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<td></td>
</tr>
<tr>
<td>PV16: Harmonious relationship between labour and management existed in the project site and hence no work disruptions were reported during project</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dimension Items</strong></td>
<td><strong>Performance</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td><strong>(7)</strong></td>
<td><strong>(3)</strong></td>
</tr>
<tr>
<td>TPV1: Timely delivery of resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPV2: Harmonious relationship on site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPV3: A clear plan was formulated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPV4: No delays in securing funds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPV5: No effect of weather and climatic conditions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPV6: No design changes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPV7: At handover there were no apparent defects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td><strong>Performance</strong></td>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td><strong>(6)</strong></td>
<td><strong>(3)</strong></td>
<td><strong>(3)</strong></td>
</tr>
<tr>
<td>CPV1: Equipments at pre budgeted rates.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPV2: Stable labour costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPV3: No increase materials cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPV4: Minimum variations co</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPV5: Adverse effect on quality of groundwater level.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPV6: No financial claims at completion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Site Disputes</strong></td>
<td><strong>DPV1: No serious dispute</strong></td>
<td><strong>DPV1: No serious dispute</strong></td>
</tr>
</tbody>
</table>
**Execution:**

**PV17:** This project has led to air pollution in the adjoining areas.

**PV18:** This project has led to depletion of the precious natural and mineral resources in the surrounding areas.

**PV19:** There has been an increase in solid waste due to the construction of the current project.

**PV20:** Accidents were often reported during project construction.

**PV21:** Near misses occurred quite often during construction.

**PV22:** Fatalities did occur on this project during construction.

**PV23:** The construction work utilised environmentally friendly technology.

**PV24:** This project has led to the increased release of toxic material.

**PV25:** No delays were experienced in securing funds during project implementation.

**PV26:** At the time of handover, the current project was free from apparent defects.

**PV27:** The project contractors were often called back during the Defects Liability Period to repair defects.

**PV28:** Weather and climatic conditions did not have much impact on delaying the project.

**PV29:** The current project has utilised reusable and recyclable materials in construction work.

**PV30:** The right material was used for the construction work.

**PV31:** Employees working in the current project possessed requisite skills and most of them had worked on similar kinds of projects in the past.

**PV32:** A sound quality management system was strictly adhered to during project execution phase of the current project.

**PV33:** Training was imparted to the workers in order to develop a positive attitude and also to enable them to apply the right method of work.

**PV34:** All stakeholders associated with the current project supervised the quality of the project in all its phases.

**PV35:** Proper medical facilities were available for people working on the project.

**Environmental Impact Performance (4):**

**EPV1:** Project has led to air pollution.

**EPV2:** Increased solid waste.

**EPV3:** Utilised environmentally friendly technology.

**EPV4:** Project has led to depletion of natural resources.

**Quality Performance (3):**

**QPV1:** Right material was used for the construction work.

**QPV2:** A sound QMS adhered to.

**QPV3:** Workers were trained on positive attitudes.

**Safety Performance (3):**

**SPV1:** Accidents were reported.

**SPV2:** Fatalities did occur.

**SPV3:** Near misses occurred.

**Environmental Impact Performance (3):**

**EPV1:** Project has led to air pollution.

**EPV2:** Project has given rise to increase in solid waste.

**EPV3:** Utilised environmentally friendly technology.

**Quality Performance (3):**

**QPV1:** Right material was used for the construction work.

**QPV2:** A sound QMS was adhered to.

**QPV3:** Workers were trained on positive attitudes.

**Safety Performance (2):**

**SPV1:** Accidents were reported.

**SPV2:** Fatalities did occur.
The results show that the cost construct has positive correlation with time construct and negative correlation with quality construct. However, quality performance deteriorates when cost performance improves. The second order measurement model, shows that the quality constructs possesses the maximum explanatory power. It is also the most reliable amongst the KPIs. However, all the other KPIs were also found to have adequate explanatory power of overall project performance. This indicates that the measurement items across all constructs may be considered as valid and reliable which may be successfully utilized by the project managers while evaluating construction projects. The CFA findings of the second order measurement model reveal that cost is the most important followed by quality whereas safety comes last.

8.1.3 Summary findings regarding CSFs

The procedure of identifying and confirming CSFs was also carried out in three stages, (literature review, exploratory phase and confirmatory phase), similar to the stages enumerated in section 8.1.2. A list of 30 variables (shown in table 8.2) influencing project success was identified based on literature review and discussion with experts. These variables were subjected to EFA which yielded 27 success variables loading in six components representing project success namely project related, client related, consultant related, contractor related, supply chain related and external environment related factors. Out of the six success factors, client related, consultant related and contractor related factors are stakeholder based whereas project related factor is based on project features and characteristics. Supply chain related factor is based on management processes in terms of sourcing and delivering of right materials and components in time and external environment related factor addresses all environmental issues that affect project success. The relative importance of the six CSFs varies. The results reveal that project related factor is the most important factor followed by client related factor while contractor related factor turns out to be the least in order of importance.

The 27-item six factor scale of CSFs was further analysed using CFA which resulted in 17 item six construct scale of CSFs for CDF construction projects. Table 8.2 summarises the findings of the qualitative analysis, exploratory analysis and the confirmatory analysis.
Table 8.2: Summary of the CSFs and success variables in both survey I and survey II.

<table>
<thead>
<tr>
<th>Literature review and discussion with experts</th>
<th>Exploratory Study (Phase I)</th>
<th>Confirmatory Study (Phase II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Success Variables)</td>
<td>Dimension</td>
<td>Items</td>
</tr>
<tr>
<td>SV1: The location and Site conditions did not affect the construction of this project.</td>
<td>PSV1:</td>
<td>Influence of Design Complexity</td>
</tr>
<tr>
<td>SV2: Design Complexity of project (Type, size, nature and number of floors) has influenced the project cost and time.</td>
<td>PSV2:</td>
<td>Adhered to the requisite Quality standards.</td>
</tr>
<tr>
<td>SV3: Project planning, Scheduling and control were adequately done on this project</td>
<td>PSV3:</td>
<td>Continuous monitoring of actual expenditures.</td>
</tr>
<tr>
<td>SV4: The client secured necessary funds for the project and hence there were no delays in material acquisition and payments to contractor.</td>
<td>PSV4:</td>
<td>Formal dispute resolution structures.</td>
</tr>
<tr>
<td>SV5: The client got the design documents approved on time for this project.</td>
<td>PSV5:</td>
<td>Effect of location and Site conditions.</td>
</tr>
<tr>
<td>SV6: The client had adequate experience on similar kind of projects.</td>
<td>PSV6:</td>
<td>Adequate Information sharing and collaboration.</td>
</tr>
<tr>
<td>SV7: Information sharing and collaboration among project participants were adequate in the current project.</td>
<td>PSV7:</td>
<td>Adequate Project planning and, Scheduling.</td>
</tr>
<tr>
<td>SV8: The construction work adhered to the requisite Quality standards.</td>
<td>PSV8:</td>
<td></td>
</tr>
<tr>
<td>SV9: Continuous monitoring of actual expenditures and project schedules and their comparison with the budget was done regularly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV10: There was a formal organization structure for dispute resolution within the project organization.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV11: Site Managers possessed requisite skills necessary for the kind of projects executed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV12: The contractor had adequate technical skills and experience on similar type of projects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV13: The contractor used latest construction methods in the project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV14: The community did not raise any social, political or cultural issues against construction of the current project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV15: The project execution was adversely affected by the surrounding weather and climatic conditions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SV16: Macro- economic conditions (such as interest rates, inflation) did not</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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significantly affect the execution of this project.

SV17: The project was affected by the Governance policy of the relevant government agencies which affects project success.

SV18: The consultant was highly committed to ensuring construction work according to design specifications.

SV19: There were adequate designs, specifications and documentations for the use of contractor.

SV20: The client emphasized on completing the current project very fast without any reference to quality.

SV21: The client tended to purchase construction materials at cheaper rate which led to the dilution of other project objectives.

SV22: No variations in original design took place in the current project during construction phase.

SV23: The level of technological sophistication considered in the project was satisfactory.

SV24: There were no incidences of disagreements resulting from industrial relations prevailing at the time of project implementation.

SV25: The physical and ecological conditions surrounding the project were favourable to project execution.

SV26: There were very few internal procurement challenges

SV27: The client’s decisions were timely and objective.

SV28: Right equipments were available in the construction site of this project.

SV29: The project faced stringent insurance and warranty contractual requirements.

SV30: Working capital was adequate.

ESV3: Effect of the Governance policy.

ESV4: Favourable physical and ecological conditions.

ESV5: Effect of Macro- economic conditions.

ESV6: No incidences industrial unrests.

SV3: Effect of the surrounding weather

LSV1: Few internal procurement challenges

LSV2: Right equipments were available.

LSV3: Effect of stringent insurance/warranty rules.

Consultant related factor (3)

SSV1: No variations were incorporated.

SSV2: Adequate designs/specifications and documentations.

SSV3: Adequate consultant committed to project.

RSV1: Site Managers possessed requisite skills.

RSV2: Contractor had adequate technical skills.

RSV3: Contractor used latest construction methods.

Consultant related factor (2)

Contractor related factor (3)

Contractor related factor (2)
Testing of the first order measurement model and the second order measurement model (that includes mediation of external environment related factor) through appropriate test statistics indicate that both models are acceptable. In the first order model, some constructs are found to be positively correlated while others are negatively correlated. For instance, project related construct has positive correlation with client related construct and negative correlation with environment construct. This probably indicates that the positive influence of project related factor is accompanied by the positive influence on client related factor and vice-versa. However, the influence of project related factor on environment is negative.

The first order model further shows that the project related construct possesses the maximum explanatory power followed by consultant related construct while the environment related construct has the minimum explanatory power. Further project related construct is also has the highest reliability. Similarly the remaining five constructs were also found to posses adequate scale reliability. This indicates that the measurement items across all constructs may be considered as valid and reliable which may be successfully utilized by the project managers for evaluating CSFs of construction projects.

The second order construct and its relationships with the first order constructs enables project managers to view the project success at a higher level. Due to this, the model could reveal patterns of relationships among the constructs which are otherwise not visible in the first order model. The second order model shows that all the six CSFs are important in determining the success of CDF construction projects, as shown through the standardised second order loadings. The external environmental related factor possess the most influence on project success followed by project related factor while supply chain related factor has the least influence.

8.1.4 Summary findings regarding the Performance Evaluation Framework
A SEM was developed to evaluate the impact of CSFs on project success. Further, it was hypothesised that project success is positively associated with overall project performance which is again expressed in terms of time, cost, quality, safety, site disputes and environmental impact. The reliability of the twelve constructs and of the
model was found satisfactory. The GOF indices of the structural model were also found quite satisfactory. However, not all the path coefficients were significant.

- **The influence of CSFs on project success**
  The results indicate that all the CSFs are appropriate success factors for CDF construction projects since they have high factor loadings that are significant at 5%. Based on the loadings of these CSFs on project success, it can be stated that the most important CSF is *project-related factor*, followed by *consultant-related factor, client-related factor, contractor-related factor, supply chain-related factor* and *external environment-related factor* in descending order of importance.

  The results of the SEM model also suggest that mediation of external environment related factor into the relationships between project success and each of the CSFs is not fully supported.

- **The association between project success and overall project performance**
  Given that all the CSFs were found to influence the success of CDF construction projects, the main challenge facing these projects is still construction management which is undertaken by the client, consultants and contractors. The success of construction management is reflected through overall project performance. The association of project success and overall project performance was found to be significant and positive indicating that the two concepts are related in the assessment of project performance.

- **The relationship between overall project performance and KPIs**
  Results of SEM indicate that “cost” is the predominant indicator of overall project performance followed by “quality”, “time” and “site disputes” in that order. Three of these indicators cost, time and quality are well represented in the literature on the “iron triangle” and have not been contradicted in the current study. “Site disputes” being a contemporary measure of performance, is an addition to the iron triangle emerging from the current study which seeks to ensure harmony at the construction site (David, 2009; Tabish & Jha, 2011).
The remaining two performance indicators, safety and environmental impact were not significant. The reason for this insignificant relationship of safety with overall project performance seems to be its intangibility. Further, the outcome of environmental impact of a project becomes evident long after the construction process is completed. Because of this, it may not occur to the project stakeholders that a project may have some adverse environmental impact.

Whereas cost and time performances were positively related to overall project performance, quality and site disputes performance were negatively related.

8.2 Managerial implications of the findings

The findings of the current study have several implications to the managers and stakeholders involved in the implementation of public sector construction projects. Below is a brief description of these implications.

- The findings of the study on project characteristics and respondents’ demographic profile imply that some of the project procurement approaches are more cost effective than others.

- The findings of KPIs imply that public sector construction projects can be evaluated on the basis of six KPIs namely cost, time, quality, site disputes, safety and environmental impact. The positive and negative relationships among the KPIs give important insights to the managers to the fact that when performance on one KPI improves, the performance on the other KPIs might improve or deteriorate.

- The final findings of KPIs also imply that while measuring performance of public construction projects, project cost is the most important performance indicator, followed by time, quality and site disputes.

- Findings reveal that cost and time performance are positively related to overall project performance whereas quality and site disputes are negatively related to overall project performance. This implies that improvement in cost and time performance will improve overall project performance whereas insistence on quality and site dispute resolution could undermine overall project
performance. Therefore project stakeholders consider pursuance of quality as an effort that requires additional cost and time thereby impacting negatively on overall project performance.

- Further, the findings also imply that while implementing public sector construction projects, there are six CSFs that influence the success of public sector construction projects. Project success can therefore, be evaluated on the basis of each individual success variables which may be used as a check list to pinpoint areas of weaknesses which may need to be corrected in case of unsatisfactory performance on a particular item.

- Project related factor is relatively more important on success of public sector construction projects implying that project characteristics are likely to have significant impact on the project than the remaining factors. Therefore, the findings provide insights to the managers in terms of how to monitor the progress of public construction projects based on CSFs.

- Further, the inter-correlations amongst three pairs of CSFs imply that project stakeholders should take a holistic view of CSFs while determining their influence on project success as one CSF is likely to be associated with another CSF.

- Similarly, the findings imply that project success and overall project performance are distinct components of a performance evaluation framework. They are however associated although each is captured through different constructs.

**8.3 Recommendations**

The project stakeholders can use this performance evaluation framework to clarify their understanding of performance of public sector construction projects during construction and be able to take corrective action in order to improve overall performance. It is therefore, recommended that project stakeholders should

- Consider using those project procurement approaches which are cost effective in order to avoid cost overrun on the projects.
Understand the needs of the community through proper involvement of the representatives of the community and other stakeholders and accordingly select suitable projects which would cater to their needs.

Understand the urgency of evaluating public sector construction projects on multi-dimensional performance measures incorporating economic, social and environmental aspects. Develop appropriate operational metrics to reflect the three broad dimensions of performance of public sector construction projects.

Develop a holistic performance evaluation framework of public sector construction projects consisting of the six KPIs with the help of 17 observable performance related variables.

Allocate considerable amount of resources into the issues relating to project time, cost, quality and site disputes of public construction projects. This is because cost, time, quality and site disputes were relatively more important.

On the basis of KPIs, identify the CSFs that are appropriate for attainment of success on the various KPIs and consider monitoring the progress of public sector construction projects on the basis of CSFs.

Put more emphasis on project characteristics as they ranked higher in importance among the CSFs influencing project success. However, the contractors play an important role in the day-to-day management of the construction activity. Thus even though the other factors were not ranked as high as the project related factor, the managers should allocate sufficient resources to the remaining factors as well which would enable them to achieve satisfactory success on these CSFs for public sector construction projects.

Distinguish between successful project implementation and overall project performance and utilize the framework developed to compare success of different types of construction projects on different CSFs. Similarly, project managers could compare overall project performance of different projects based on specific performance indicators.

8.4 Limitations of the study

The current study suffers from the following limitations
The responses to the questionnaire were based on perceptions of respondents regarding the performance measurement variables and project success variables. However, the frame of mind of the respondents may differ, and hence, the responses provided are fraught with some element of subjectivity.

Secondly, the study was based on the perceptions of clients, consultants and contractors but left out the community which actually benefits from the public sector construction projects and for whom the projects are expected to be relevant. The study did not consider community satisfaction with project implemented though this is one of the desired outcomes of public construction projects.

Further, there could be direct interactions between CSFs and the various KPIs. The scope of the current study could not allow the researcher to examine such direct relationships.

Similarly, the data for the development of the measurement instrument was gathered in one province in Kenya. The prevailing circumstances in Western province, Kenya could be different from the circumstances in other provinces in Kenya and other developing countries.

Further these projects are characterized by the involvement of many stakeholders with varying interests, numerous bureaucratic hassles and of course, varying political interests, which facilitates corruption. Corruption which includes bribery, embezzlement, kickbacks and fraud in construction projects undermines the delivery of infrastructure services. These practices can lead to increases in cost, extension of time and poor quality of constructed facilities. The element of corruption has not been included in the present study.

8.5 Directions for Future Research

This section recommends some potentially useful future research that can address some of the limitations of this study.

Researchers could undertake a study in performance evaluation from the perspectives of the community which constitutes the actual beneficiaries of the
projects. In such a study, the level of community satisfaction with the projects implemented can be addressed.

➢ Further future studies can attempt to identify the direct relationship between the CSFs and KPIs through empirical studies. Also, future studies may examine moderating factors that may have an effect on the relationship between CSFs and project success.

➢ Future researchers could advance the current construction project performance evaluation scale and test its applicability within the context of other constituencies in different regions in Kenya and those projects in other developing countries. There is, therefore, an important need to undergo cross-cultural validation of the instrument using data gathered from other provinces of Kenya and other developing countries as well in order to enhance the generalization of items.

➢ Finally, a study incorporating the effect of corruption in performance evaluation of public sector construction projects is of great importance. This is because the intended objectives of public sector construction projects can be properly realised in a corruption free environment. It is a well known fact that these kinds of projects are severely affected by the scams prevalent in many countries.

REFERENCES


