Factors Affecting Performances of Small Projects in Small Island States – Stakeholders’ Perceptions

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Abstract. Numerous are the studies that investigate the performances of big construction projects. However, in this particular investigation, the emphasis is on small construction projects. The intent was to capture the perceptions of the major stakeholders, that is the clients, contractors and consultants on the factors that could affect the performances of such small projects, which have limited budget, are of short duration and to further complex the situation, the projects are executed in small island states, such as the Republic of Mauritius. After an extensive literature search, a list of 61 performance indicators was made, which was further grouped into 10 main clusters, namely (i) cost; (ii) time; (iii) quality; (iv) productivity; (v) owner; (vi) regulator; (vii) employee; (viii) health and safety; (ix) learning; and (x) environment. A performance success survey was devised, tested and refined before circulating to the major stakeholders (response rate; client – 89%; contractors – 68.5% and consultants – 56%). With Kendall’s coefficient of concordance W = 0.954 being greater than 0.5, the degree of agreement amongst stakeholders was found to be statistically significant. Hence the major 5 factors that impeded on the performances of smaller construction projects being executed in small island countries were found to be due to (i) poor leadership skills; (ii) absence of skilled force; (iii) inadequate liquidity within the company; (iv) escalation of material prices and (v) unavailability of resources.

1. Introduction
The economic growth of any nation rests on many pillars, and one of them is the construction industry, which through the development of physical infrastructures, such as buildings, roads and bridges among others, indicates the country’s financial evolution [1]. In the construction sector, consultants, such as project managers, architects, engineers, cost estimators among others, are appointed to ensure that the project is designed to prevailing codes of practice and executed accordingly. During the construction phase, the professionals make sure that the selected contractor carries out the works according to plans and specifications. They all work towards similar goals, that of completing the project on time, within the allocated budget and of quality matching industry standard, which are the commonest indicators for construction success [2,3,4, 5, 6, 7].

The literature has extensive works carried out by researchers that show how the performances on major construction projects are getting worse with time. In the United Arab Emirates, failures of many projects have been attributed to inexperienced workforce, inadequate supervision of the works, poor site management, incompetent leaders among the teams, lack and poorly serviced equipment that most of the time are not in use due to breakdowns [8]. According to Ajayi et al. [9], the contractor(s) selected has a substantial effect on the success or failure of the projects. A study by Puspassari [3] acknowledged 46 factors, which he categorised under eight groups, that could be held responsible for the poor performance of such construction ventures, namely; clients’ issues, contractors’ issues, consultants’ issues, subcontractors’ issues, factors related to material and labour, contractual relationship factors, project procedures and external environment factors. The poor performances on such major projects do happen despite the appointment and supervision by a team of consultants.
Compared to major construction projects, small ones [10] have a shorter lifespan, higher ambiguity and limited formal documentation. Repetitive jobs and simple construction process are key attributes of small projects [11]. Projects were categorised as being small whenever the project value ranged between US$0.1 million and US $5 million [12].

Most of the research done concerning gauging the performances of construction projects have been oriented towards big countries (developed and industrialised ones). The performances of small projects in small island states have never been looked at. Briguglio in his publication of 1995 [13] describes how Small Island Developing States (SIDS), due to their trivial extent, insularity, inaccessibility and proneness to natural catastrophes, face a lot of problems that put their economies at stake, which is reflected in either their Gross Domestic Product (GDP) or Gross National Product (GNP) par capital. Smallness is undeniably an attribute of SIDS, measured in terms of its number of inhabitants, area of land and/or its GNP, which makes that particular state economically disadvantageous for the reasons listed hereunder [14,15, 16, 17, 18]

- The natural resources are limited making the economy dependent on imports.
- The resulting protected economic environment following the adoption of the import-substitution policies had products of mediocre class, upper charges and also created a comparable market in non-domestically produced goods.
- The local marketplace is small, and high affinity on export arcades exist.
- Inability to diversify its exports makes the nation dependent on a limited number of goods and services.
- Inadequate capacity to impact on national fees.
- Inadequate capability to exploit economies of scale.
- Insufficient local opposition as the state sustains numerous companies with similar product.
- Workforce - experienced and efficient administrators are limited.

Furthermore, all islands are insular, and by their location, the main constraints for these specific nations are the higher per unit transportation cost as all their imports and exports have to use either air or sea transportation. Unreliability in transport services and time delays handicaps the provision of industrial supplies/materials. Natural calamities impact significantly on the island economy due to its small size.

In this particular study, the intent is to investigate the stakeholders’ perceptions of the factors that affect performances of small construction projects in small island states; the case study was done for the Republic of Mauritius. The Island of Mauritius, consist of some outer islands with the two main ones being Mauritius and Rodrigues, is located South-West of the Indian Ocean. The main island, Mauritius with a population of 1,219,265 as at 1st July 2016 and an area of 1865 km² [19] is one of the listed Small Island Developing States [20].

2. Methodology

The different stakeholders within the construction sector are illustrated in figure 1. However, it should be made clear that even when occupying the same position, the attributes such as the roles, rights, responsibilities, and principles of action may sometimes differ from nation to nation [21]. In all, there are three major stakeholders, clients, contractors and consultants.
The following steps were followed in the determination of factors affecting construction performance.

Step 1: Conduct a thorough literature review.
Using the different available resources, (internet, library databases, google scholar, science direct and reputable online open access journals among others), an in-depth review of the literature was performed to identify the key factors affecting the performance/success of construction projects in general.

A list of 61 performance indicators, obtained from the works of the following researchers, namely; Ugwu and Haupt [22], Jha and Iyer [23], Love et al. [24], Navon [25], Samson and Lema [26], Kupenas [27], Cheung et al. [28], Lehtonen[29], Brown and Adams [30], DETR [31], Dissannayaka and Kumaraswamy [32], Karim and Marosszky [33], Reichelt and Lyneis [34], were divided into 10 clusters, namely:

(a) cost,
(b) time,
(c) quality,
(d) productivity,
(e) owner,
(f) regulator,
(g) employee,
(h) health and safety,
(i) learning, and
(j) environment.

Step 2: Development of survey instruments.
Using the outcomes of the intensive literature review, the project performance/success survey questionnaire was devised, part 1 gathered information on both the respondent and his/her firm while part 2 included questions about the ten groups assigned to the performance indicators.

Step 3: Pilot study.
The survey questionnaire was circulated to a team of experts, which comprised:
(i) a professional architect,
(ii) two professional engineers,
(iii) two builders,
(iv) two clients with experience in construction and
(v) two quantity surveyors.

After taking on board the different comments and recommendations, the questionnaire was updated.

Step 4: Determination of performance factors from major stakeholders.
The refined survey questionnaire was circulated by emails and post to projects’ clients, consultants and contractors to capture their perceptions concerning factors that hinder performance on construction projects. 65 Clients, 50 Consultants and 92 Contractors (all grades included) were contacted. The five-point Likert scale was utilised [1: Not important; 2: Less important; 3: moderate; 4: Important; and 5: Very important] with a mean cut-off score of 3.0, hence all indicators with a mean score less than 3.0 was discarded from the list.

In this particular research work, the relative importance index method (RII) was utilised to determine owners’, consultants’, and contractors’ sensitivities of the relative significance of the acknowledged performance dynamics. The RII was calculated using the formula proposed by Ugwu and Haupt [22], Jha and Iyer [23], and Chueng et al. [28], which is as follows.

\[
RII = \frac{\sum w}{AN} \tag{1}
\]

where \(W\) is the weight given to each factor by the respondents and ranges from 1 to 5; A being the highest weight equal to 5 and \(N\) being the total number of participants.

Kendall’s coefficient was used to determine the degree of agreement among the three essential groups of respondents on a zero to one scale. Kendall’s \(W\) is a value between 0 and 1, where 0 indicates no agreement and 1 indicates complete agreement. \(W\) is calculated using the equation by Kendall et al. [35].

\[
W = \frac{12 \sum D^2}{m^2N(N^2-1)} \tag{2}
\]

Where:
- \(D\) = the difference between the individual sum of ranks of the stakeholders and the average of the sum of ranks of the factors
- \(\sum D^2\) = the sum of the squares of the difference
- \(m\) = number of the stakeholder’s group
- \(N\) = number of factors being ranked.

The problem is to find if there is an agreement or concordance among the three different stakeholders regarding the 61 performance factors.

Null hypothesis (H0: There is an insignificant degree of agreement among Clients, Contractors and Consultants) and the alternative hypothesis (H1: There is a statistically significant degree of consensus among owners, contractors and consultants) were tested.

3. Results and discussions

Despite the busy schedule of the major stakeholders, 89% of the clients; 68.5% of the contractors and 56% of the consultants responded to the survey.

Tables 1 to 3 illustrate the results obtained from the survey of major stakeholders regarding the factors affecting the performance of construction projects. Each chart provides information about each factor’s RII, mean score and overall rank.
Table 1. RII and ORDER of 61 factors – Clients’ perceptions.

| Rank | PERFORMANCE FEATURES                                      | Weighted total | RII  | Item Mean |
|------|----------------------------------------------------------|----------------|------|-----------|
| 1    | Company’s market share                                   | 61             | 0.200| 1.000     |
| 2    | Liquidity within company                                 | 2              | 0.828| 4.138     |
| 3    | Project - Cash flow                                      | 32             | 0.448| 2.241     |
| 4    | Project - Profit rate                                    | 29             | 0.466| 2.328     |
| 5    | Project - Overheads                                      | 23             | 0.503| 2.517     |
| 6    | Project - design cost                                    | 27             | 0.479| 2.397     |
| 7    | Material and equipment cost                              | 31             | 0.455| 2.276     |
| 8    | Project - labour cost                                    | 33             | 0.448| 2.241     |
| 9    | Project - over time cost                                 | 21             | 0.528| 2.638     |
| 10   | Stimulus Package – Cost/budget                           | 24             | 0.497| 2.483     |
| 11   | Re-work - Cost                                           | 5              | 0.776| 3.879     |
| 12   | Variations                                               | 6              | 0.762| 3.810     |
| 13   | Wasteage - Materials                                     | 11             | 0.724| 3.621     |
| 14   | Regular project budget update                            | 34             | 0.448| 2.241     |
| 15   | Cost control method                                      | 47             | 0.345| 1.724     |
| 16   | Escalation - material prices                             | 13             | 0.710| 3.552     |
| 17   | Currency prices - Differentiation                        | 30             | 0.462| 2.310     |
| 18   | Time - Site preparation                                  | 22             | 0.510| 2.552     |
| 19   | Planned construction time                                | 17             | 0.662| 3.310     |
| 20   | Late deliveries - Percentage                             | 25             | 0.493| 2.466     |
| 21   | Variation orders – Implementation time                    | 7              | 0.759| 3.793     |
| 22   | Defects rectification – Time required                     | 8              | 0.755| 3.776     |
| 23   | Claim approval - Delays                                  | 9              | 0.734| 3.672     |
| 24   | Regular payments – Average delays                        | 10             | 0.728| 3.638     |
| 25   | Unavailability of resources                              | 4              | 0.817| 4.086     |
| 26   | Average delay because of closures leading to materials shortage | 60            | 0.203| 1.017     |
| 27   | Conformity with specification                            | 45             | 0.348| 1.741     |
| 28   | The presence of a skilled workforce                      | 33             | 0.829| 4.128     |
| 29   | Quality - equipment and raw materials                    | 14             | 0.697| 3.483     |
| 30   | Quality assessment method in company                     | 36             | 0.434| 2.172     |
| 31   | Quality training/meeting                                | 50             | 0.338| 1.690     |
| 32   | Difficulties met during the project                      | 26             | 0.493| 2.466     |
| 33   | New projects rate per annum                              | 37             | 0.424| 2.121     |
| 34   | Relationship between Management & labour                 | 42             | 0.776| 3.879     |
| 35   | Absence rate on Project                                 | 12             | 0.714| 3.569     |
| 36   | Work sequence with respect to programme                  | 15             | 0.683| 3.414     |
| 37   | Coordination bet. owner and other stakeholders           | 28             | 0.469| 2.345     |
| 38   | PM – leadership skills                                   | 1              | 0.855| 4.276     |
| 39   | Speed and reliability of service                         | 35             | 0.445| 2.224     |
| 40   | Disagreements - Client & project stakeholders            | 51             | 0.334| 1.672     |
| 41   | Amount of re-works                                      | 16             | 0.682| 3.411     |
| 42   | Compliance cost (Authorities)                            | 59             | 0.248| 1.241     |
| 43   | Frequency - Non-compliant cases                          | 57             | 0.272| 1.362     |
| 44   | Regulatory documents – Quality & Readiness              | 19             | 0.655| 3.276     |
| 45   | Issues – Site conditions                                | 38             | 0.369| 1.845     |
| 46   | Workers’ defiance                                       | 39             | 0.362| 1.810     |
| 47   | Employment and skill improvement                         | 40             | 0.355| 1.776     |
| 48   | Workers stimulus                                        | 58             | 0.272| 1.362     |
| 49   | Sense of belonging to work                              | 18             | 0.659| 3.293     |
| 50   | HOS - Application in organization                       | 36             | 0.297| 1.483     |
| 51   | Project place – safe to reach                            | 48             | 0.345| 1.724     |
| 52   | Project accident rate – (Reportable ones only)           | 49             | 0.338| 1.690     |
| 53   | Project Assurance rate                                  | 54             | 0.300| 1.500     |
| 54   | Learning (individual practice and former history)       | 52             | 0.324| 1.621     |
| 55   | Learning (best practice & exp. of others)               | 43             | 0.348| 1.741     |
| 56   | Work group                                              | 55             | 0.300| 1.500     |
| 57   | Appraisal of failures & Provision of solution           | 20             | 0.655| 3.276     |
| 58   | Quality of Air                                          | 53             | 0.321| 1.603     |
| 59   | Level of noise                                          | 44             | 0.348| 1.741     |
| 60   | Trashes                                                 | 46             | 0.348| 1.741     |
| 61   | Climate condition                                       | 41             | 0.355| 1.776     |
### Table 2. RII and ORDER of 61 factors – Consultants’ perceptions.

| PERFORMANCE FEATURES | Rank | Weighted total | RII | Item Mean |
|-----------------------|------|----------------|-----|-----------|
| 1. Company’s market share | 61   | 41             | 0.293 | 1.464    |
| 2. Liquidity within company | 3    | 125            | 0.893 | 4.464    |
| 3. Project - Cash flow | 33   | 90             | 0.643 | 3.214    |
| 4. Project - Profit rate | 30   | 92             | 0.657 | 3.286    |
| 5. Project - Overheads | 26   | 94             | 0.671 | 3.357    |
| 6. Project - design cost | 28   | 94             | 0.671 | 3.357    |
| 7. Material and equipment cost | 32   | 91             | 0.650 | 3.250    |
| 8. Project - labour cost | 34   | 90             | 0.643 | 3.214    |
| 9. Project - over time cost | 23   | 94             | 0.671 | 3.357    |
| 10. Stimulus Package – Cost/budget | 41   | 87             | 0.621 | 3.107    |
| 11. Re-work - Cost | 7    | 118            | 0.843 | 4.214    |
| 12. Variations | 6    | 119            | 0.850 | 4.250    |
| 13. Wastage - Materials | 17   | 112            | 0.800 | 4.000    |
| 14. Regular project budget update | 35   | 89             | 0.636 | 3.179    |
| 15. Cost control method | 48   | 81             | 0.579 | 2.893    |
| 16. Escalation - maternal prices | 4    | 124            | 0.886 | 4.429    |
| 17. Currency prices - Differentiation | 31   | 91             | 0.650 | 3.250    |
| 18. Time - Site preparation | 24   | 94             | 0.671 | 3.357    |
| 19. Planned construction time | 19   | 108            | 0.771 | 3.857    |
| 20. Late deliveries - Percentage | 27   | 94             | 0.671 | 3.357    |
| 21. Variation orders – Implementation time | 13   | 115            | 0.821 | 4.107    |
| 22. Defects rectification – Time required | 14   | 114            | 0.814 | 4.071    |
| 23. Claim approval - Delays | 15   | 113            | 0.807 | 4.036    |
| 24. Regular payments – Average delays | 16   | 112            | 0.800 | 4.000    |
| 25. Unavailability of resources | 5    | 122            | 0.871 | 4.357    |
| 26. Average delay because of closures leading to materials shortage | 60   | 42             | 0.300 | 1.500    |
| 27. Conformity with specification | 21   | 95             | 0.679 | 3.393    |
| 28. The absence of a skilled workforce | 2    | 126            | 0.900 | 4.500    |
| 29. Quality - equipment and raw materials | 18   | 113            | 0.671 | 3.357    |
| 30. Quality assessment method in company | 38   | 89             | 0.636 | 3.179    |
| 31. Quality training/meeting | 25   | 94             | 0.671 | 3.357    |
| 32. Difficulties met during the project | 37   | 89             | 0.636 | 3.179    |
| 33. New projects rate per annum | 39   | 87             | 0.621 | 3.107    |
| 34. Relationship between Management & labour | 22   | 95             | 0.679 | 3.393    |
| 35. Absence rate on Project | 6    | 119            | 0.850 | 4.250    |
| 36. Work sequence with respect to programme | 8    | 118            | 0.843 | 4.214    |
| 37. Coordination bet. owner and other stakeholders | 29   | 93             | 0.664 | 3.321    |
| 38. PM – leadership skills | 1    | 128            | 0.914 | 4.571    |
| 39. Speed and reliability of service | 36   | 89             | 0.636 | 3.179    |
| 40. Disagreements – Client & project stakeholders | 31   | 76             | 0.543 | 2.714    |
| 41. Amount of re-works | 11   | 116            | 0.829 | 4.143    |
| 42. Compliance cost (Authorities) | 59   | 64             | 0.457 | 2.286    |
| 43. Frequency - Non-compliant cases | 57   | 67             | 0.479 | 2.393    |
| 44. Regulatory documents – Quality & Readiness | 20   | 107            | 0.764 | 3.821    |
| 45. Issues – Site conditions | 40   | 87             | 0.621 | 3.107    |
| 46. Workers’ defiance | 42   | 87             | 0.621 | 3.107    |
| 47. Employment and skill improvement | 43   | 86             | 0.614 | 3.071    |
| 48. Workers stimulus | 58   | 64             | 0.457 | 2.286    |
| 49. Sense of belonging to work | 10   | 116            | 0.829 | 4.143    |
| 50. HOS - Application in organization | 56   | 67             | 0.479 | 2.393    |
| 51. Project place - safe to reach | 49   | 80             | 0.571 | 2.857    |
| 52. Project accident rate – (Reportable ones only) | 50   | 79             | 0.564 | 2.821    |
| 53. Project Assurance rate | 54   | 70             | 0.500 | 2.500    |
| 54. Learning (individual practice and former history) | 52   | 76             | 0.543 | 2.714    |
| 55. Learning (best practice & exp. of others) | 45   | 84             | 0.600 | 3.000    |
| 56. Work group | 55   | 69             | 0.493 | 2.464    |
| 57. Appraisal of failures & Provision of solution | 9    | 117            | 0.836 | 4.179    |
| 58. Quality of Air | 53   | 72             | 0.514 | 2.571    |
| 59. Level of noise | 46   | 84             | 0.600 | 3.000    |
| 60. Trashes | 47   | 82             | 0.586 | 2.929    |
| 61. Climate condition | 44   | 85             | 0.607 | 3.036    |
The highest 20 performance factors, as identified by the major stakeholders, are as shown in table 4 to 6.

### Table 3. RII and ORDER of 61 factors – Contractors’ perceptions.

| PERFORMANCE FEATURES | Rank | Weighted total | RII | Item Mean |
|----------------------|------|----------------|-----|-----------|
| 1. Company’s market share | 32 | 293 | 0.644 | 3.222 |
| 2. Liquidity within company | 2 | 276 | 0.876 | 4.381 |
| 3. Project - Cash flow | 36 | 165 | 0.524 | 2.619 |
| 4. Project - Profit rate | 33 | 166 | 0.527 | 2.635 |
| 5. Project - Overheads | 29 | 171 | 0.543 | 2.714 |
| 6. Project - design cost | 31 | 169 | 0.537 | 2.683 |
| 7. Material and equipment cost | 25 | 156 | 0.524 | 2.619 |
| 8. Project - labour cost | 37 | 161 | 0.511 | 2.556 |
| 9. Project - over time cost | 27 | 177 | 0.562 | 2.810 |
| 10. Stimulus Package – Cost/budget | 25 | 186 | 0.590 | 2.952 |
| 11. Re-work - Cost | 7 | 264 | 0.838 | 4.190 |
| 12. Variations | 8 | 264 | 0.838 | 4.190 |
| 13. Wastage - Materials | 12 | 255 | 0.810 | 4.048 |
| 14. Regular project budget update | 38 | 159 | 0.505 | 2.524 |
| 15. Cost control method | 49 | 144 | 0.457 | 2.286 |
| 16. Escalation - material prices | 14 | 251 | 0.797 | 3.984 |
| 17. Currency prices - Differentiation | 34 | 165 | 0.524 | 2.619 |
| 18. Time - Site preparation | 28 | 171 | 0.543 | 2.714 |
| 19. Planned construction time | 17 | 242 | 0.768 | 3.841 |
| 20. Late deliveries - Percentage | 30 | 171 | 0.543 | 2.714 |
| 21. Variation orders – Implementation time | 9 | 264 | 0.838 | 4.190 |
| 22. Defects rectification – Time required | 18 | 241 | 0.765 | 3.825 |
| 23. Claim approval - Delays | 10 | 260 | 0.825 | 4.127 |
| 24. Regular payments – Average delays | 11 | 258 | 0.819 | 4.095 |
| 25. Unavailability of resources | 6 | 264 | 0.838 | 4.190 |
| 26. Average delay because of closures leading to materials shortage | 61 | 66 | 0.210 | 1.048 |
| 27. Conformity with specification | 21 | 210 | 0.667 | 3.333 |
| 28. The absence of a skilled workforce | 1 | 278 | 0.883 | 4.413 |
| 29. Quality - equipment and raw materials | 15 | 248 | 0.787 | 3.937 |
| 30. Quality assessment method in company | 40 | 156 | 0.485 | 2.429 |
| 31. Quality training/meeting | 24 | 195 | 0.619 | 3.095 |
| 32. Difficulties met during the project | 23 | 198 | 0.629 | 3.143 |
| 33. New projects rate per annum | 41 | 153 | 0.486 | 2.429 |
| 34. Relationship between Management & labour | 26 | 185 | 0.582 | 2.937 |
| 35. Absence rate on Project | 13 | 254 | 0.806 | 4.032 |
| 36. Work sequence with respect to programme | 16 | 246 | 0.781 | 3.965 |
| 37. Coordination bet. owner and other stakeholders | 32 | 167 | 0.530 | 2.651 |
| 38. PM – leadership skills | 4 | 274 | 0.870 | 4.349 |
| 39. Speed and reliability of service | 39 | 158 | 0.502 | 2.508 |
| 40. Disagreements – Client & project stakeholders | 52 | 125 | 0.397 | 1.984 |
| 41. Amount of re-works | 3 | 275 | 0.873 | 4.365 |
| 42. Compliance cost (Authorities) | 60 | 92 | 0.292 | 1.460 |
| 43. Frequency - Non-compliant cases | 58 | 104 | 0.330 | 1.651 |
| 44. Regulatory documents – Quality & Readiness | 19 | 214 | 0.679 | 3.397 |
| 45. Issues – Site conditions | 42 | 153 | 0.486 | 2.429 |
| 46. Workers’ definance | 43 | 153 | 0.486 | 2.429 |
| 47. Employment and skill improvement | 44 | 152 | 0.483 | 2.413 |
| 48. Workers' stimulus | 59 | 94 | 0.298 | 1.492 |
| 49. Sense of belonging to work | 5 | 268 | 0.851 | 4.254 |
| 50. HOS - Application in organization | 57 | 111 | 0.352 | 1.762 |
| 51. Project place - safe to reach | 50 | 144 | 0.457 | 2.286 |
| 52. Project accident rate – (Reportable ones only) | 51 | 125 | 0.397 | 1.984 |
| 53. Project Assurance rate | 55 | 119 | 0.378 | 1.889 |
| 54. Learning (individual practice and former history) | 53 | 121 | 0.364 | 1.921 |
| 55. Learning (best practice & exp. of others) | 46 | 151 | 0.479 | 2.397 |
| 56. Work group | 56 | 116 | 0.368 | 1.841 |
| 57. Appraisal of failures & Provision of solution | 20 | 213 | 0.676 | 3.381 |
| 58. Quality of Air | 54 | 121 | 0.384 | 1.921 |
| 59. Level of noise | 47 | 149 | 0.473 | 2.365 |
| 60. Trashes | 48 | 147 | 0.467 | 2.333 |
| 61. Climate condition | 45 | 151 | 0.479 | 2.397 |

The highest 20 performance factors, as identified by the major stakeholders, are as shown in table 4 to 6.
Table 4. 20 highest performance factors as ranked by Clients.

| PERFORMANCE FEATURES                      | Rank | Weighted total | RII  | Item Mean |
|-------------------------------------------|------|----------------|------|-----------|
| 38 PM – leadership skills                 | 1    | 248            | 0.855| 4.276     |
| 2 Liquidity within company                | 2    | 240            | 0.828| 4.138     |
| 28 The absence of a skilled workforce    | 3    | 239            | 0.824| 4.121     |
| 25 Unavailability of resources            | 4    | 237            | 0.817| 4.086     |
| 11 Re-work - Cost                         | 5    | 225            | 0.776| 3.879     |
| 12 Variations                             | 6    | 221            | 0.762| 3.810     |
| 21 Variation orders – Implementation time | 7    | 220            | 0.759| 3.793     |
| 22 Defects rectification – Time required  | 8    | 219            | 0.755| 3.776     |
| 23 Claim approval - Delays                | 9    | 213            | 0.734| 3.672     |
| 24 Regular payments – Average delays      | 10   | 211            | 0.728| 3.638     |
| 13 Wastage - Materials                    | 11   | 210            | 0.724| 3.621     |
| 35 Absence rate on Project                | 12   | 207            | 0.714| 3.569     |
| 16 Escalation - material prices           | 13   | 206            | 0.710| 3.552     |
| 29 Quality - equipment and raw materials  | 14   | 202            | 0.697| 3.483     |
| 36 Work sequence with respect to programme| 15   | 198            | 0.683| 3.414     |
| 41 Amount of re-works                     | 16   | 191            | 0.682| 3.411     |
| 19 Planned construction time              | 17   | 192            | 0.662| 3.310     |
| 49 Sense of belonging to work             | 18   | 191            | 0.659| 3.293     |
| 44 Regulatory documents – Quality & Readiness| 19  | 190            | 0.655| 3.276     |
| 57 Appraisal of failures & Provision of solution | 20 | 190            | 0.655| 3.276     |

Table 5. 20 highest performance factors as ranked by Consultants.

| PERFORMANCE FEATURES                      | Rank | Weighted total | RII  | Item Mean |
|-------------------------------------------|------|----------------|------|-----------|
| 38 PM – leadership skills                 | 1    | 128            | 0.914| 4.571     |
| 28 The absence of a skilled workforce    | 2    | 126            | 0.900| 4.500     |
| 2 Liquidity within company                | 3    | 125            | 0.893| 4.464     |
| 16 Escalation - material prices           | 4    | 124            | 0.886| 4.429     |
| 25 Unavailability of resources            | 5    | 122            | 0.871| 4.357     |
| 35 Absence rate on Project                | 6    | 119            | 0.850| 4.250     |
| 11 Re-work - Cost                         | 7    | 118            | 0.843| 4.214     |
| 36 Work sequence with respect to programme| 8    | 118            | 0.843| 4.214     |
| 57 Appraisal of failures & Provision of solution | 9  | 117            | 0.836| 4.179     |
| 49 Sense of belonging to work             | 10   | 116            | 0.829| 4.143     |
| 41 Amount of re-works                     | 11   | 116            | 0.829| 4.143     |
| 12 Variations                             | 12   | 115            | 0.821| 4.107     |
| 21 Variation orders – Implementation time | 13   | 115            | 0.821| 4.107     |
| 22 Defects rectification – Time required  | 14   | 114            | 0.814| 4.071     |
| 23 Claim approval - Delays                | 15   | 113            | 0.807| 4.036     |
| 24 Regular payments – Average delays      | 16   | 112            | 0.800| 4.000     |
| 13 Wastage - Materials                    | 17   | 112            | 0.800| 4.000     |
| 29 Quality - equipment and raw materials  | 18   | 111            | 0.793| 3.964     |
| 19 Planned construction time              | 19   | 108            | 0.771| 3.857     |
| 44 Regulatory documents – Quality & Readiness| 20 | 107            | 0.764| 3.821     |
Table 6. 20 highest performance factors as ranked by Contractors.

| PERFORMANCE FEATURES | Rank | Weighted total | RII  | Item Mean |
|----------------------|------|----------------|------|-----------|
| 28 The absence of a skilled workforce | 1    | 278            | 0.883| 4.413     |
| 2 Liquidity within company | 2    | 276            | 0.876| 4.381     |
| 41 Amount of re-works | 3    | 275            | 0.873| 4.365     |
| 38 PM – leadership skills | 4    | 274            | 0.870| 4.349     |
| 49 Sense of belonging to work | 5    | 268            | 0.851| 4.254     |
| 25 Unavailability of resources | 6    | 264            | 0.838| 4.190     |
| 11 Re-work - Cost | 7    | 264            | 0.838| 4.190     |
| 12 Variations | 8    | 264            | 0.838| 4.190     |
| 21 Variation orders – Implementation time | 9    | 264            | 0.838| 4.190     |
| 23 Claim approval - Delays | 10   | 260            | 0.825| 4.127     |
| 24 Regular payments – Average delays | 11   | 258            | 0.819| 4.095     |
| 13 Wastage - Materials | 12   | 255            | 0.810| 4.048     |
| 35 Absence rate on Project | 13   | 254            | 0.806| 4.032     |
| 16 Escalation - material prices | 14   | 251            | 0.797| 3.984     |
| 29 Quality - equipment and raw materials | 15   | 248            | 0.787| 3.937     |
| 36 Work sequence with respect to programme | 16   | 246            | 0.781| 3.905     |
| 19 Planned construction time | 17   | 242            | 0.768| 3.841     |
| 22 Defects rectification – Time required | 18   | 241            | 0.765| 3.825     |
| 44 Regulatory documents – Quality & Readiness | 19   | 214            | 0.679| 3.397     |
| 57 Appraisal of failures & Provision of solution | 20   | 213            | 0.676| 3.381     |

From the above tables, it was observed that the performance factors that made the list of 20 were the same but their ranking, which is based on the RII value, was different. Out of the top 5 factors, the following three were familiar to all major stakeholders, namely (i) PM – leadership skills, (ii) liquidity within the company and (iii) absence of skilled workforce.

Performance factor 1: COST

The cost factors that stakeholders had in common were;

*Liquidity within the company* – Situations may arise when payment for works done is being delayed, and in order not to hinder progress, the company may use its funds to make payments to workers and/or suppliers.

*Re-works* – Occurrence of re-works may be synonymous to shoddy quality, which in turn may result in the company paying, out of its pocket, for materials and labour used for the remedying or re-works. This decreases the profit of the company and also, depending on the extent of reworks, may delay the completion of the project.

*Variations* – Change orders by Clients/Consultants or unforeseen circumstances, during the construction phase of the project may end up consuming more than the contingency funds allowed on the project. Hence, resulting in the project going over the budget.

*Wastage of materials* - In Hong Kong, a study by Chu (2004), identified the contribution of the following materials waste to the total project cost: concrete 4%, block work 10%, waste from screeding and plastering 15%, packaging 5% and that of formwork is based on the number of times it is re-used.

*Escalation of material prices* – This is beyond the control of Contractors. However, if no provision for the escalation of material prices is made in the contract, then the contractor will suffer a loss. In Mauritius, the price escalation is mainly associated with an increase in the amount of petrol as the significant part of the building materials are imported from countries such as South Africa, England, and Egypt among others.
Performance factor 2: TIME

*Variation orders (VO)* – Implementation Time of variation orders, depending on the degree of complexity of the variations, may impede on the overall duration of the project.

*Defects rectifications* – Time required to remedy defects, depending on the extent of the flaws, may impact negatively on the overall duration of the project.

*Claim approval* – On most projects, the approval of claims followed a process and any delays encountered has severe negative impacts on the disbursement of funds, which in turn affects the project duration. For illustration, if the contractor’s claim is not approved on time, this means that payment will be delayed and as a consequence supplier will not be paid on time, and future delivery/supply of materials for the project will be jeopardised.

*Regular payments* – Is linked to the approval of the claims.

*Unavailability of resources* – Not having the required plant and equipment, as well as the human resources (key personnel) for a project, have negative consequences on the overall duration.

Performance factor 3: QUALITY

*The absence of a skilled workforce* - Unavailability of qualified/competent staff within the project team is foreseen to impact negatively on the project performance by clients, consultants as well as contractors. The level of education of the workers entering the Mauritian construction to work on the different trades is shallow. It has been observed, through our survey, that most of the workers have studied up to grade six, end of primary school. Currently, the workers are formed on the job site. However, the training they get is not appropriate. It is high time that a proper and rigorous training scheme be explicitly devised for all the different construction trades and be disseminated on the job site itself by qualified trainers. Only after developing the required competencies, will the workers be in a position to execute their tasks to the required standard and quality? An assessment of the developed skillsets is mandatory and each successful worker should either be provided with a certificate of competence or a skill card on which it is stipulated the skill level achieved for his trade. This system, once implemented, will enable future employers to appoint these workers directly for the job for which they are competent and in so doing the quality as well as the overall performance of the project will be sustained.

*Quality – equipment and raw materials* – All tools, equipment and materials to be used on a project need to satisfy the required minimum quality standards.

Performance factor 4: PRODUCTIVITY

*Absence rate on the project* – On many projects where the worker is not employed by the contractor, it has been observed that the price of absenteeism is high. For workers engaged in a construction company, fewer absentees are witnessed, which is attributed to the fact that these employees are paid an attendance bonus.

*Work sequence concerning the programme* - during the construction phase, it is essential that the proposed works methodology (which is expected to be logical and practical) is followed as such an endeavour enables timely completion of the works. This is in line with the results obtained by Samson and Lema (2005), who revealed that the order of tasks to be executed impacts on the efficiency of contractors’ delivery outcomes.

Performance factor 5: CLIENT SATISFACTION

The ability of project managers to lead a project has been placed in the 1st place by the participants of the research work. The results of this particular research work concur with the study done by Cheung et al. (2004) where correlations were established between leadership skills of project managers and extent of project success/failure as well as client satisfaction.
Performance factor 6: REGULATORY FACTORS

Quality and availability of regulator documentation have been ranked by all respondents in the 1st position as it upsets the performance of community satisfaction. A similar trend was observed in the study carried out by Samson and Lema (2005).

Performance factor 7: EMPLOYEE FACTORS

“Belonging to work” has been ordered by all stakeholders in number one position because the latter factor typically increases efficiency and performance of building venture, which is coherent with the outcomes of Jha and Iyer (2006). In the Mauritian construction sector, there is a tendency for job contractors as well as sub-contractors to employ the minimum number of workers for a job. Hence, the workers are expected to demonstrate multi-tasking skillsets, which is seldom the case, and as a consequence, the project on the whole suffers.

Performance factor 8: HEALTH & SAFETY FACTORS

This aspect is very significant to all the parties as health and safety factors, within the construction environment, increases project performance globally. This is in line with the observations made by Cheung et al. (2004).

Performance factor 9: LEARNING FACTORS

A study by Samson and Lema (2005) confirmed that knowledge acquired from earlier practice distresses the performance of projects. Most of the time clients tend to lean towards the budget rather than other technical issues that are important for the smooth running of the project.

Performance factor 10: ENVIRONMENTAL FACTORS

Climate condition prevailing on site has been ranked in the 1st position by the clients’, professionals’, and builders’ participants as it distresses the efficiency and time performance of the project.

3.1 Degree of Agreement between Responding Groups

The extent to which the different parties to the survey agree or disagree among themselves were determined using Kendall’s coefficient of concordance, and the result is presented in table 7.

With Kendall’s coefficient of concordance $W = 0.954$ being more significant than 0.5 (Landis and Koch, 1977), the null hypothesis, $H_0$ is rejected as the degree of agreement among the major stakeholders are statistically significant.

[Null hypothesis ($H_0$: There is an insignificant degree of agreement among Clients, Contractors and Consultants) and the alternative hypothesis ($H_1$: There is a statistically significant degree of consensus among owners, contractors and consultants) were tested.]

4. Concluding remarks

A structured questionnaire approach was adopted to capture the perceptions of the major stakeholders operating within the construction industry regarding the performances of smaller projects being executed in small island states.
### Table 7. Kendall’s coefficient of concordance for stakeholders’ survey.

| PERFORMANCE FEATURES | Client | Consultants | Contractors | $\gamma_R$ | $D$ | $D^2$ |
|-----------------------|--------|-------------|-------------|------------|-----|-------|
| 1 Company’s market share | 61     | 61          | 22          | 144        | -51 | 2601  |
| 2 Liquidity within company | 2      | 2           | 2           | 6          | 87  | 7569  |
| 3 Project - Cash flow | 32     | 32          | 36          | 100        | -7  | 49    |
| 4 Project - Profit rate | 29     | 29          | 33          | 91         | 2   | 4     |
| 5 Project - Overheads | 23     | 23          | 29          | 75         | 18  | 324   |
| 6 Project - design cost | 27     | 27          | 31          | 85         | 8   | 64    |
| 7 Material and equipment cost | 31    | 31          | 35          | 97         | -4  | 16    |
| 8 Project - labour cost | 33     | 33          | 37          | 103        | -10 | 100   |
| 9 Project - over time cost | 21     | 21          | 27          | 69         | 24  | 576   |
| 10 Stimulus Package – Cost/budget | 24    | 24          | 25          | 73         | 20  | 400   |
| 11 Re-work - Cost | 5      | 5           | 7           | 17         | 76  | 5776  |
| 12 Variations | 6      | 6           | 8           | 20         | 73  | 5329  |
| 13 Wastage - Materials | 11     | 11          | 12          | 34         | 59  | 3481  |
| 14 Regular project budget update | 34     | 34          | 38          | 106        | -13 | 169   |
| 15 Cost control method | 47     | 47          | 49          | 143        | -50 | 2500  |
| 16 Escalation - material prices | 13     | 13          | 14          | 40         | 53  | 2809  |
| 17 Currency prices - Differentiation | 30    | 30          | 34          | 94         | -1  | 1    |
| 18 Time - Site preparation | 22     | 22          | 28          | 72         | 21  | 441   |
| 19 Planned construction time | 17     | 17          | 17          | 51         | 42  | 1764  |
| 20 Late deliveries - Percentage | 25     | 25          | 30          | 80         | 13  | 169   |
| 21 Variation orders – Implementation time | 7      | 7           | 9           | 23         | 70  | 4900  |
| 22 Defects rectification – Time required | 8      | 8           | 18          | 34         | 59  | 3481  |
| 23 Claim approval - Delays | 9      | 9           | 10          | 28         | 65  | 4225  |
| 24 Regular payments – Average delays | 10     | 10          | 11          | 31         | 62  | 3844  |
| 25 Unavailability of resources | 4      | 4           | 6           | 14         | 79  | 6241  |
| 26 Average delay because of closures - leading to shortage | 60    | 60          | 61          | 181        | -88 | 7744  |
| 27 Conformity with specification | 45     | 45          | 21          | 111        | -18 | 324   |
| 28 Absence of skilled workforce | 3      | 3           | 1           | 7          | 86  | 7396  |
| 29 Quality - equipment and raw materials | 14     | 14          | 15          | 43         | 50  | 2500  |
| 30 Quality assessment method in company | 36     | 36          | 40          | 112        | -19 | 361   |
| 31 Quality training/meeting | 30     | 30          | 24          | 123        | -31 | 961   |
| 32 Difficulties met during the project | 26     | 26          | 23          | 75         | 18  | 324   |
| 33 New projects rate per annum | 37     | 37          | 41          | 115        | -22 | 484   |
| 34 Relationship between Management & labour | 42     | 42          | 26          | 110        | -17 | 289   |
| 35 Absence rate on Project | 12     | 12          | 13          | 37         | 56  | 3136  |
| 36 Work sequence with respect to programme | 15     | 15          | 16          | 46         | 47  | 2209  |
| 37 Coordination bet. owner and other stakeholders | 28     | 28          | 32          | 88         | 5   | 25    |
| 38 PM – leadership skills | 1      | 1           | 4           | 6          | 87  | 7569  |
| 39 Speed and reliability of service | 35     | 35          | 39          | 109        | -16 | 256   |
| 40 Disagreements - Client & project stakeholders | 51     | 51          | 55          | 154        | -61 | 3721  |
| 41 Amount of re-works | 16     | 16          | 3           | 35         | 58  | 3364  |
| 42 Compliance cost (Authorities) | 59     | 59          | 60          | 178        | -85 | 7225  |
| 43 Frequency - Non-compliant cases | 57     | 57          | 58          | 172        | -79 | 6241  |
| 44 Regulatory documents – Quality & Readiness | 19     | 19          | 19          | 57         | 36  | 1296  |
| 45 Issues – Site conditions | 38     | 38          | 42          | 118        | -25 | 625   |
| 46 Workers’ defiance | 39     | 39          | 43          | 121        | -28 | 784   |
| 47 Employment and skill improvement | 40     | 40          | 44          | 124        | -31 | 961   |
| 48 Workers stimulus | 58     | 58          | 59          | 175        | -82 | 6724  |
| 49 Sense of belonging to work | 18     | 18          | 5           | 41         | 52  | 2704  |
| 50 H&S - Application in organization | 56     | 56          | 57          | 169        | -76 | 5776  |
| 51 Project place - safe to reach | 48     | 48          | 50          | 146        | -53 | 2809  |
| 52 Project accident rate – (Reportable ones only) | 49     | 49          | 51          | 149        | -56 | 3136  |
| 53 Project Assurance rate | 54     | 54          | 55          | 163        | -70 | 4900  |
| 54 Learning (individual practice and former history) | 52     | 52          | 53          | 157        | -64 | 4096  |
| 55 Learning (best practice & exp. of others) | 43     | 43          | 46          | 132        | -39 | 1521  |
| 56 Work group | 55     | 55          | 56          | 166        | -73 | 5329  |
| 57 Appraisal of failures & Provision of solution | 20     | 20          | 20          | 60         | 33  | 1089  |
| 58 Quality of Air | 53     | 53          | 54          | 160        | -67 | 4489  |
| 59 Level of noise | 44     | 44          | 47          | 135        | -42 | 1764  |
| 60 Trashes | 46     | 46          | 48          | 140        | -47 | 2209  |
| 61 Climate condition | 41     | 41          | 45          | 127        | -34 | 1156  |

$$\Sigma R = 5673 \quad \Sigma D = 16233$$

$$\Sigma D^2 = 16233 - 0 \times 5673 = 0.953$$

$$W = 82$$
According to this study, the major factors found to impede on performances were as listed below:

1. PM – leadership skills
2. The absence of a skilled workforce
3. Liquidity within company
4. Escalation - material prices
5. Unavailability of resources
6. Absence rate on Project
7. Re-work - Cost
8. Work sequence concerning the programme
9. Appraisal of failures & Provision of solution
10. The sense of belonging to work
11. Amount of re-works
12. Variations
13. Variation orders – Implementation time
14. Defects rectification – Time required
15. Claim approval - Delays
16. Regular payments – Average delays
17. Wastage - Materials
18. Quality - equipment and raw materials
19. Planned construction time
20. Regulatory documents – Quality & Readiness

With Kendall’s coefficient of concordance W = 0.954 being more significant than 0.5 it was found that the degree of agreement among the major stakeholders was statistically significant and that all the above factors can be used to explain the success or failure of such projects.

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