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## **FACTORS ENHANCING CONSTRUCTION PROJECT SUCCESS CRITERIA: AN APPRAISSAL**

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### **Abstract**

*Each construction project have unique characteristics influencing the factors that enhances the success criteria. Thispaper identified through literature and expert opinion the essential factors that enhances the construction project success criteria and analysed the degree of severity of these factors from the perspectives of the consultants and the contractors in Nigeria.Ten consultants organisations and ten contracting organisation were studied in this work.A survey questionnaire was administered toelicit information from contractors and consultants based on their experiences with identified factors enhancing construction project success criteria.The datawereanalysed from the perspective of the targeted respondent as well as conducting mean analysis from the responses of the respondents. The analysis of twentyseven factors identified and considered in the questionnaire survey using relative important index revealed that tendering and procurement method used, effective communication system, timely involvement of project stakeholders', timely provision of data to key players, project team leader experience, technical skills of the project team leader are the leading factors enhancing construction project success criteria from the consultant perspectives while timely involvement of project stakeholders', tendering and procurement method used, Effective communication system, timely provision of data to key players, Technical skills of the project team leader are the leading factors from contractors perspectives. The mean analysis revealed a significant level of agreement between the contractors and the consultants on these factors. Analysis using spearman rank correlation with obtained value of +0.97 confirmed the high level of agreement between the contractors and the*

*consultants on the factors enhancing construction project success criteria. Hypothesis formulated were tested resulting to the acceptance of the alternative hypothesis: there is a significant degree of agreement between consultants and contractors on the critical factors enhancing the construction project success criteria with  $t$ -calculated less than the  $t$ -tabulated. The paper concluded that both consultants and contractors generally agree on the ranking order of the factors enhancing the construction project success criteria and recommended among others that contractors and consultants should give more attention to the critical factors that influence the construction project success criteria in order to achieve cost effective and value for money of any construction project.*

**Keywords:** *Construction project, Success factors, criteria, appraisal*

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## **Introduction**

Construction industry is dynamic in nature due to increasing uncertainties in technology, construction project budget and development processes. In this modern days, construction project are becoming much more complex and difficult in nature thereby making the construction project team facing unprecedented and continuous changes in the design and construction processes. The study of construction project success and the critical success factors are considered to be a means of improving the effectiveness of the construction projects. However, the concept of project success has remained ambiguously defined in the mind of the construction industry professionals. Construction project success factor can be perceived as the main variables that contribute to construction project success (Dvir et al, 1998). Westerveld, (2003) also saw construction project success factors as a lever that can be operated by the construction project managers to increase chances of obtaining the desired outcome in a construction project. The success of any construction project is dependent on delivering the project within the predetermined cost, quality and time (Clement, 2015). Initially, project success was referred to as reaching the objectives and the planned results in compliance with the predetermined conditions of time, cost, and quality performance. Construction project success criteria which is more centered on cost, time and quality performance was considered not enough to define the

success of any construction project. Project success was considered to be a complex multidimensional concept encompassing many attributes (Pinnington and Mir, 2014). Each construction project is unique in nature and characteristics, therefore the success criteria's varies in line with the construction project nature and characteristics. Achieving success and enhancing value for money in any construction project demands critical look on some factors that could stand against it by the construction project stakeholders. This study is on the identification of factors that have direct bearing on the success of construction project success criteria regardless of the provision of the 'golden triangle' for construction project, that is cost, time and quality performance.

### **Literature review**

Various study have focused on construction project success criteria: cost, time and quality performance as the basis for measuring the success of construction project regardless of construction project nature and characteristics. Each construction project is unique in nature demanding other parameters or factors that can also enhanced it success. Loana et al(2012), identified eighteen factors that can effects construction project success to includes: clearly define goal and direction, accurate schedule and plan, timely and comprehensive control, adequate use of project management techniques, adequate use of technical skill, competent project team members etc. In another study conducted by Albert et al (2013), forty four factors that can enhance construction project success were also identified and grouped under five major heading: construction project management action, construction project related factors, external environment factors, construction project procedure factors and human related factors. Project management action factors include communication system, control mechanism, feedback capabilities etc., project related factors include construction project size and complexity etc., construction project procedure involves procurement and tendering methods etc., external environment factors include economic, social and physical environment while human related factors include client experience, client emphasis on quick construction, technical skill of the construction project team, planning skill of the construction project team leader etc. Ika (2009) pointed out five factors

that could enhanced construction project success: smart people, smart planning, open communication, careful risk management and strong project closure. These factors have level of influence on the success of any construction project which requires an evaluation to establish their level of impact.

### Valueformoneyandconstructionprojectsuccessfactors

Anago (2012) stated that the value for money simply means receiving the full value of what is paid for. Abiodun (2012) in his opinion pointed out that value for money is simply obtaining the maximum benefit with the resources available and the right balance between economy, efficiency and effectiveness. Achieving value for money may be seen as being a balance between satisfying client needs and expectations and the resources required to achieve them. Value for money not only measures the cost of goods and services but also takes into account the mix of cost with quality, resource use, and fitness for purpose and timeliness to judge whether or not, together they constitute good value. Factors such as effective communication, technical skill project team, effective planning, careful risk management, strong construction project closure etc. improve value for money in construction project. The diagrammatic representation of influence of success factors on value for money in construction project is shown in Figure1 as modified from the perspectives of the author.

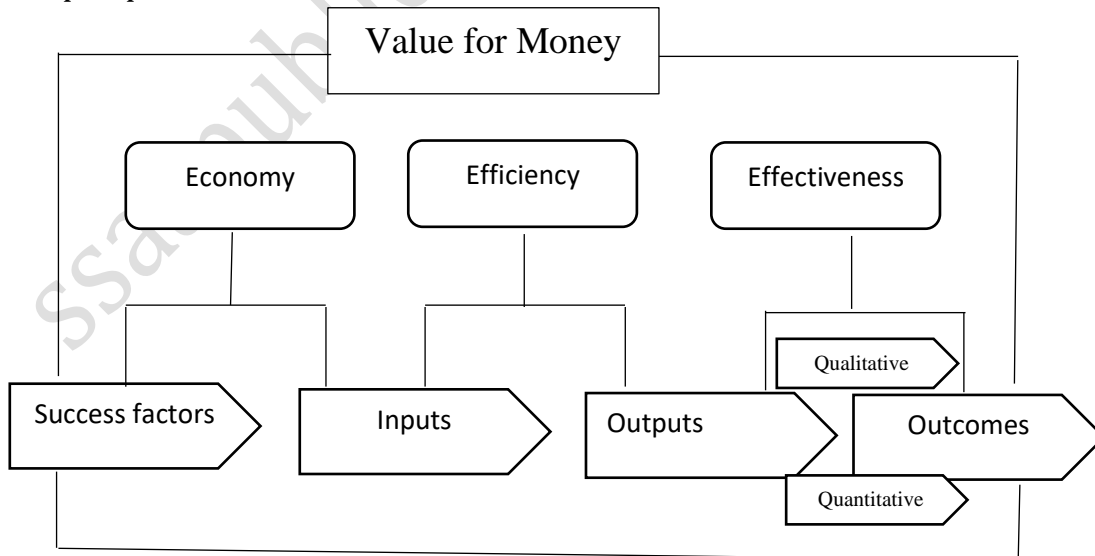


Fig. 1

### **Research objectives**

This study is conducted with the sole aim of identifying and appraising of the factors that enhances construction project success criteria. To identify certain factors and evaluate their relative impact to the construction project success criteria.

### **Research methodology**

#### **Sample and response rate**

This research was conducted in the northern part on Nigeria. The targeted population consisted of contractors and consultants operating in the region and well experienced in construction project. Targeted organizations are key players in the provision of construction project and consultancy services in construction project. The response rate were increased by approaching more than one respondent in the same organization to obtain the relevant and required information in this study. Ten consultancy organisations and ten contracting organisations were selected for this study. In the overall 110 well-structured closed ended questionnaires were administered to the targeted respondents. 55 questionnaires were distributed to ten consultancy organisation and 55 questionnaires also were distributed to ten contracting establishment. No organization received more than 11 number questionnaires to avoid response bias in this study. A total number of 46 questionnaires were retrieved from the consultancy organisations amounting to a response rate of 83.64% while a total number of 43 questionnaires were retrieved from the contracting organizations amounting to a response rate of 78.18%. The response rate from the consultancy organization is 5.46% higher than that from the contracting organizations. The average of the response rate between the contracting and the consultancy organisation is approximately 80.91% which is considered reasonable for which conclusion can be drawn from the findings in the course of this study.

#### **Questionnaire design**

A questionnaire survey was conducted to elicit the opinion of the contractors and the consultants regarding the factors enhancing the success of construction project. The questionnaire was constructed based on a literature reviewed, responses from face-to-face interview and personal opinion of the

authors. A total of 67 factors were identified from previous study. Some of the factors were found to be the same as identified and one is chosen. Factors that are similar were merged reducing the total number of the factors to 27 which were subjected to analysis taking cognizance of the respondent's responses. These factors were considered and analysed using the statistical tools of relative importance index (RII) value to rank the impact factors as it enhanced construction project success. The respondents were asked to rate the extent to which the various identified factors enhance the success of construction project on a five-point likert scale, where grade 5 is for factor with very high impact (FVHI), 4 for factor with high impact (FHI), 3 for factor with moderate impact (FMI), 2 for factor with little impact (FLI) and 1 for factor with very little impact (FVLI). Statistical tool of relative important index and as well as spearman rank correlation were used for data analysis. Relative importance index (RII) value used to rank the severity of the identified factors. Degree of agreement between the consultants and the contractors on the critical factors enhancing the construction project success criteria were verified using the spearman rank correlation.

**Null hypothesis  $H_0$ :** There is an insignificant degree of agreement between consultants and contractors on the critical factors enhancing the construction project success criteria

**Alternative Hypothesis  $H_1$ :** There is a significant degree of agreement between consultants and contractorson the critical factors enhancing the construction project success criteria

**Table 1: Factors enhancing the success construction project criteria**

| Factor                               | source     | comment  |
|--------------------------------------|------------|----------|
| Effective communication system       | literature | modified |
| Effective project control mechanism  | literature | modified |
| Feedback capabilities                | literature | selected |
| Functional organisational structure  | literature | selected |
| Functional safety system/environment | literature | selected |
| Effective quality assurance system   | literature | modified |
| Control of subcontractor's works     | literature | selected |
| Tendering & procurement method used  | literature | modified |
| Political stability                  | literature | selected |

|  |            |          |
|--|------------|----------|
| Viable economic environment                  | literature | modified |
| Use of modern technology                     | literature | selected |
| Client experience/involvement                | literature | merged   |
| Client ability to brief                      | literature | selected |
| Project team leader experience               | literature | selected |
| Technical skills of the project team leader  | literature | selected |
| Managerial skills of the project team leader | literature | merged   |
| Effective workers incentive scheme           | interview  | selected |
| Timely involvement of project stakeholders'  | literature | selected |
| Project team leader working relation         | literature | selected |
| Clearly define project goal and direction    | literature | selected |
| Adequate use of project management tool      | literature | selected |
| Clearly define role and responsibilities     | literature | selected |
| Synergy of the project team member           | literature | selected |
| Adequate risk management                     | literature | selected |
| Timely provision of data to key players'     | literature | selected |
| top management support                       | literature | selected |
| Harmonious industrial relation               | literature | modified |

### Data presentation and analysis

**Table 1: Response rate according to category of respondents**

| <i>Respondent<br/>(No)</i>          | <i>Distribution<br/>(No)</i> | <i>Responses(No)</i> | <i>Response rate (%)</i> |
|-------------------------------------|------------------------------|----------------------|--------------------------|
| <i>Consultants</i>                  | 55                           | 46                   | 83.64                    |
| <i>Contractors</i>                  | 55                           | 43                   | 78.18                    |
| <b><i>Average response rate</i></b> |                              | <b>80.91%</b>        |                          |

Source: Author's field survey, 2018

From table 1 above 83.64 percent of the respondents are from the consultancy organisation while 78.18 percent of the respondents are from the contracting organisation. This representation therefore depicts primary parties involves in the management of construction projects in Nigeria. The average response rate from the field survey stand at 80.91 percent, thus depicting adequate participation for the study.

**Table 2: Years of Experience in Construction Activities**

| <i>Years of experience</i> | No of Respondents (f) | Average year of experience (x) | Fx            |
|----------------------------|-----------------------|--------------------------------|---------------|
| 1-10                       | 35                    | 5.5                            | 192.5         |
| 11-20                      | 23                    | 15.5                           | 356.5         |
| 21-30                      | 21                    | 25.5                           | 535.5         |
| 31-40                      | 10                    | 35.5                           | 355           |
| <b>TOTAL</b>               | <b>89</b>             |                                | <b>1439.5</b> |

Source: Author's calculation, 2018

Average year of experience of the respondents in construction activities =  $fx/n = 1439.5/89$  approximately 16years

The above table 2 shown the respondent's years of experience in the construction industry and found the mean year to be approximately 16. This shows that the respondents have adequate years of working experience to respond to the research enquiry.

**Table 3: Ranking of the factors enhancing construction project success criteria using Relative Important Index: Consultants perspectives**

| <i>FACTORS</i>                                      | RII VALUE | RANK |
|---|-----------|------|
| <i>Tendering &amp; procurement method used</i>      | 4.32      | 1    |
| <i>Effective communication system</i>               | 4.15      | 2    |
| <i>Timely involvement of project stakeholders'</i>  | 4.03      | 3    |
| <i>Timely provision of data to key players</i>      | 3.96      | 4    |
| <i>Project team leader experience</i>               | 3.90      | 5    |
| <i>Technical skills of the project team leader</i>  | 3.88      | 6    |
| <i>Clearly define project goal and direction</i>    | 3.86      | 7    |
| <i>Managerial skills of the project team leader</i> | 3.65      | 8    |
| <i>Functional safety system/environment</i>         | 3.54      | 9    |
| <i>Control of subcontractor's works</i>             | 3.33      | 10   |
| <i>Adequate use of project management tool</i>      | 3.26      | 11   |
| <i>Effective workers incentive scheme</i>           | 3.13      | 12   |
| <i>Adequate risk management</i>                     | 3.02      | 13   |
| <i>Project team leader working relation</i>         | 3.01      | 14   |
| <i>Functional organizational structure</i>          | 2.98      | 15   |
| <i>Clearly define role and responsibilities</i>     | 2.91      | 16   |



|  |      |    |
|--|------|----|
| <i>Synergy of the project team members</i> | 2.88 | 17 |
| <i>Effective project control mechanism</i> | 2.84 | 18 |
| <i>Feedback capabilities</i>               | 2.78 | 19 |
| <i>Use of modern technology</i>            | 2.72 | 20 |
| <i>Effective quality assurance system</i>  | 2.70 | 21 |
| <i>Political stability</i>                 | 2.64 | 22 |
| <i>Client experience/involvement</i>       | 2.61 | 23 |
| <i>Client ability to brief</i>             | 2.58 | 24 |
| <i>Viable economic environment</i>         | 2.54 | 25 |
| <i>top management support</i>              | 2.53 | 26 |
| <i>Harmonious industrial relation</i>      | 2.51 | 27 |

Source: Author's field survey, 2018

Table 3 above shown the analysis of the twenty seven identified factors that can enhance the construction project success criteria from the consultant's perspectives using the relative importance index. From the Table 3 it is shown thattendering & procurement method used, effective communication system, timely involvement of project stakeholders', timely provision of data to key players, project team leader experience, technical skills of the project team leader, clearly define project goal and direction,Managerial skills of the project team leader, Functional safety system/environment, Control of subcontractor's works,Adequate use of project management tool, Effective workers incentive scheme, Adequate risk management, Project team leader working relation are the leading factors that can enhance the construction project success criteria. The relative important index of these factors are shown in the table 3 above.,

**Table 4: Ranking of the factors enhancing construction project success criteria using Relative Important Index: Contractors perspectives**

| <i>FACTORS</i>                                      | RII VALUE | RANK |
|---|-----------|------|
| <i>Timely involvement of project stakeholders'</i>  | 4.41      | 1    |
| <i>Tendering &amp; procurement method used</i>      | 4.33      | 2    |
| <i>Effective communication system</i>               | 4.21      | 3    |
| <i>Timely provision of data to key players</i>      | 4.13      | 4    |
| <i>Technical skills of the project team leader</i>  | 4.05      | 5    |
| <i>Managerial skills of the project team leader</i> | 3.99      | 6    |
| <i>Project team leader experience</i>               | 3.94      | 7    |
| <i>Control of subcontractor's works</i>             | 3.91      | 8    |
| <i>Adequate risk management</i>                     | 3.87      | 9    |
| <i>Clearly define project goal and direction</i>    | 3.32      | 10   |

|   |      |    |
|---|------|----|
| <i>Adequate use of project management tool</i>  | 3.28 | 11 |
| <i>Functional safety system/environment</i>     | 3.21 | 12 |
| <i>Effective workers incentive scheme</i>       | 3.12 | 13 |
| <i>Project team leader working relation</i>     | 3.05 | 14 |
| <i>Use of modern technology</i>                 | 2.96 | 15 |
| <i>Effective project control mechanism</i>      | 2.93 | 16 |
| <i>Functional organizational structure</i>      | 2.88 | 17 |
| <i>Clearly define role and responsibilities</i> | 2.84 | 18 |
| <i>Feedback capabilities</i>                    | 2.81 | 19 |
| <i>Synergy of the project team members</i>      | 2.79 | 20 |
| <i>Effective quality assurance system</i>       | 2.76 | 21 |
| <i>top management support</i>                   | 2.72 | 22 |
| <i>Client ability to brief</i>                  | 2.67 | 23 |
| <i>Political stability</i>                      | 2.62 | 24 |
| <i>Client experience/involvement</i>            | 2.60 | 25 |
| <i>Viable economic environment</i>              | 2.58 | 26 |
| <i>Harmonious industrial relation</i>           | 2.55 | 27 |

Source: Author's field survey 2018

Table 4 above shown the analysis of the twenty seven identified factors that can enhance the construction project success criteria from the contractor's perspectives using the relative importance index. From the Table 4 it is shown that Timely involvement of project stakeholders', Tendering & procurement method used, Effective communication system, Timely provision of data to key players, Technical skills of the project team leader, Managerial skills of the project team leader, Project team leader experience, Control of subcontractor's works, Adequate risk management, Clearly define project goal and direction, Adequate use of project management tool, Functional safety system/environment, Effective workers incentive scheme, Project team leader working relation are the leading factors that can enhance the construction project success criteria. The relative important index of these factors are shown in the table 4 above.,

**Table 5: Mean analysis of the Impact of top fourteen factors enhancing construction project success criteria ranking using Relative Important Index: Contractors and Consultants perspectives**

| <i>Factors</i>                                     | Consultants |      | Contractors |      | Mean |      |
|--|-------------|------|-------------|------|------|------|
|  | RII         | RANK | RII         | RANK | RII  | RANK |
| <i>Tendering &amp; procurement method used</i>     | 4.32        | 1    | 4.33        | 2    | 4.33 | 1    |
| <i>Effective communication system</i>              | 4.15        | 2    | 4.21        | 3    | 4.18 | 3    |
| <i>Timely involvement of project stakeholders'</i> | 4.03        | 3    | 4.41        | 1    | 4.22 | 2    |

|   |      |    |      |    |      |    |
|---|------|----|------|----|------|----|
| <i>Timely provision of data to key players</i>      | 3.96 | 4  | 4.13 | 4  | 4.05 | 4  |
| <i>Project team leader experience</i>               | 3.90 | 5  | 3.94 | 7  | 3.92 | 6  |
| <i>Technical skills of the project team leader</i>  | 3.88 | 6  | 4.05 | 5  | 3.97 | 5  |
| <i>Clearly define project goal and direction</i>    | 3.86 | 7  | 3.32 | 10 | 3.59 | 9  |
| <i>Managerial skills of the project team leader</i> | 3.65 | 8  | 3.99 | 6  | 3.82 | 7  |
| <i>Functional safety system/environment</i>         | 3.54 | 9  | 3.21 | 12 | 3.38 | 11 |
| <i>Control of subcontractor's works</i>             | 3.33 | 10 | 3.91 | 8  | 3.62 | 8  |
| <i>Adequate use of project management tool</i>      | 3.26 | 11 | 3.28 | 11 | 3.27 | 12 |
| <i>Effective workers incentive scheme</i>           | 3.13 | 12 | 3.21 | 13 | 3.17 | 13 |
| <i>Adequate risk management</i>                     | 3.02 | 13 | 3.87 | 9  | 3.44 | 10 |
| <i>Project team leader working relation</i>         | 3.01 | 14 | 3.05 | 14 | 3.03 | 14 |

**Source: Author's field survey 2018**

Table 5 above shown the analysis of the fourteen critical factors that enhance construction project success criteria using average of the relative important index from the contractors and consultants perspectives. The result shown that Tendering & procurement method used is the leading critical factor that enhance the construction project success criteria with average relative important index of 4.33. The is followed by timely involvement of project stakeholders', effective communication system, timely provision of data to key players, technical skills of the project team leader with relative importance index of 4.22, 4.18, 4.05 and 3.97 respectively. The least critical factors from the average relative important index analysis are Project team leader working relation, effective workers incentive scheme, adequate use of project management tool with relative importance index of 3.03, 3.17 and 3.27 respectively.

**Table 6: Hypothesis verification**

| <b>Respondents</b>      | <b>Rs</b> | <b>t-cal</b> | <b>t-tab</b> | <b>significant level</b> |
|-------------------------|-----------|--------------|--------------|--------------------------|
| Contractors/consultants | +0.97     | 25.62        | >43.77       | 0.05                     |

**Source: Author's field survey 2018**

Table 6 presented the results of the test of the formulated hypotheses. The results of the analysis using the spearman rank correlation revealed perfect agreement between the contractors and consultant on the identified factors enhancing the construction project success criteria with +0.97 value. The chi-square analysis result shown that the t-calculated has a value of 25.62 is much less than the t-tabulated with a value of >43.77 at 5% significant level. This implies that there is insignificant degree of agreement between consultants and contractors on the factors that enhance construction project success criteria be accepted while the null hypothesis saying that there is an insignificant

degree of agreement between consultants and contractors on the factors that enhance construction project success criteria be rejected.

### Results and discussion

In this study, the factors enhancing the construction project success criteria and their relative important index from the contractors and consultants point of view were analysed. The results of the analysis from the consultants' point of view shown that tendering & procurement method used, effective communication system, timely involvement of project stakeholders', timely provision of data to key players, project team leader experience, technical skills of the project team leader, clearly define project goal and direction, managerial skills of the project team leader, functional safety system/environment, control of subcontractor's works, adequate use of project management tool, effective workers incentive scheme, adequate risk management, project team leader working relation are the leading factors enhancing the construction project success criteria. On the side of the contractors, timely involvement of project stakeholders', tendering & procurement method used, effective communication system, timely provision of data to key players, technical skills of the project team leader, managerial skills of the project team leader, project team leader experience, control of subcontractor's works, adequate risk management, clearly define project goal and direction, adequate use of project management tool, functional safety system/environment, effective workers incentive scheme, project team leader working relation are the leading factors enhancing the construction project success criteria. Mean analysis was conducted from the contractors and consultants point of view at cut off point of 3. The results shown the critical factors enhancing the construction project success criteria are tendering & procurement method used is the leading critical factor that enhance the construction project success criteria with average relative important index of 4.33. The is followed by timely involvement of project stakeholders', effective communication system, timely provision of data to key players, technical skills of the project team leader with relative importance index of 4.22, 4.18, 4.05 and 3.97 respectively among others as shown in table 5 above. The formulated hypotheses were verified and hypothesis tested in the course of the study. The results of the spearman rank correlation revealed positive value of +0.97 indicating that there is strong agreement between the consultants and the contractors on the factors enhancing the construction project success criteria. The result of the chi-square analysis shown that the t-calculated with a value of 25.62 is less than the t-tabulated with a value of >43.77 at 5% confident level. This shown that the alternative hypotheses saying that there is a significant degree of agreement between consultants and

contractors be accepted while the null hypotheses saying that there is an insignificant degree of agreement between the contractors and the consultants be rejected.

### Conclusions

An exploratory study of factors enhancing the construction project success criteria was conducted to determine the relative level of influence of each factor from the consultants and contractors perspectives. The ranking of 27 factors as shown in table 5 revealed that the fourteen most influential and critical factors enhancing the construction project success criteria are as follows:

1. Tendering & procurement method used
2. Timely involvement of project stakeholders'
3. Effective communication system
4. Timely provision of data to key players
5. Technical skills of the project team leader
6. Project team leader experience
7. Managerial skills of the project team leader
8. Control of subcontractor's works
9. Clearly define project goal and direction
10. Adequate risk management
11. Functional safety system/environment
12. Adequate use of project management tool
13. Effective workers incentive scheme
14. Project team leader working relation

From the above findings, it was concluded that both consultants and contractors generally agree on the ranking order of the factors enhancing the construction project success criteria. This agreement is confirmed from the analysis conducted using spearman rank correlation and chi-square tools indicating the influential effects of those factors and provides a level of validation for this study. This validation was confirmed by the high values of spearman rank correlation. The result of chi-square test shown that there is no difference of opinion between contractors and consultants in the factors enhancing construction project success criteria at the significance level of 0.05.

It is recommended that contractors and consultants give more attention to the most important factors that can influence the construction n project success criteria in order to achieve cost effective and value for money of any construction project. Conclusively, it is also recommended that workshop, seminar and training session be organise as a mean of sensitizing all

stakeholders in construction as this activities would improve the practice of construction project control and management.

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