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ANALYSIS OF THE SUCCESS FACTORS INFLUENCING IN CONSTRUCTION PROJECT

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Abstract

This paper aims at investigating factors influencing success in construction project. The objectives are identify success factors existing in projects and also to examine the important index of these success factors in construction project. This study was conducted detailed manner through questionnaire and collecting the response from construction experts. There are seventeen factors identified as project success factors and based on this questionnaires are framed for survey. Detailed questionnaires are floated to Engineers, Site Engineers, Contractors and the responses are collected. It gives a background of the successful factors. Problems and constraints of the construction projects are also analyzed.

Keywords: Success factors

1. INTRODUCTION

The economic development of developing countries depends on successful implementation of new infrastructure projects. The construction industry in India is the second largest industry next to agriculture in terms of providing employment. However, the performance of Indian construction projects has not been very encouraging. In India though sufficient improvement is attained in the design field of engineering, planning and execution part is unfortunately deficient. Modern construction industry is complex and complication which needs proper planning and execution [1].

From the above point it's clear that there are some unique factors associated with each of the three groups. The designer for instance is looking for a project that will increase the level of professional development and professional satisfaction among his employees. Safety is a high-priority issue for the contractor that would not normally be an issue with the other two groups, because their employees are at much less risk during the design or operation of a building than the contractor's workers are during the construction of a building. An owner is extremely interested in knowing that the building project functions properly for the intended use and is free from long-term defects or lingering maintenance problems [2].

As one would suspect, there is some variability even within the same firm on the same project. The factors of importance range from meeting internal budgets to professional satisfaction and on to producing a job that will help the firm obtain repeat business or serve as a marketing tool for similar projects with different clients. Two designers working on the

same project may view success differently. An experienced designer serving as a project engineer may be concerned about meeting internal budget criteria as well as meeting the client's needs. An inexperienced designer who working at a lower level of responsibility may consider the opportunity to gain valuable design experience as a success criteria and be less concerned about meeting the internal budget. No single list will ever be totally comprehensive when it comes to a definition of success for a project. The criteria developed for use does give a general overall impression of each of the three groups viewpoints. It determines the "envelope" of ideas that are used to evaluate success [3][5].

2. CONSTRUCTION INDUSTRY NATURE

Construction industry is one of the booming industries in the world. As it is urban based needs proper execution as well as construction of real estate properties[6]. Most of the property is incomplete because of improper planning and execution. Success of the projects needs certain criteria. But these factors are not clearly studied or defined by the project personnels. So this project has become necessary to study some of the variables that influence the success of a project. Based on the results of survey it is anticipated that patterns will emerge as the prime factor for the success of a construction project. (Fig.1.1).

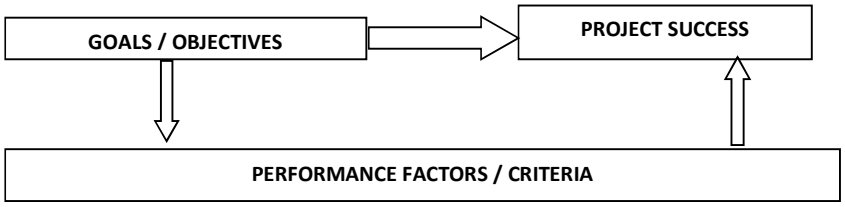

Fig. 1.1 Relationship Among Goals, Project Success and Performance Factors

3. PROJECT SUCCESS CRITERIA

Success criteria means that it relates to building construction, its scope of services, participants, project size, sophistication, design, budget, time, technological implications etc. Some others define that the success criteria of a construction depends on the owner, designer, contractor, cost and site workers. To conclude success criteria of projects are proper scheduling and execution, budget, customer's satisfaction quality, design, owner, minimization of cost and maximizing profit. While many criteria items or viewpoints are similar, there are several distinctions that relate directly to the parties involved and the type of business services they provide. Priority item and one that appears in all three lists (designer, owner, and contractor) in some form is the financial reality of doing business. The owner wants the project completed on time and on budget, and the designer and contractor both expect to meet certain profit or fee goals[4].These three viewpoints also recognize the absence of any legal claims or proceedings on a project as a desirable outcome. In other words, this is a major criteria for measuring success. Another common thread among the three groups involves meeting an appropriate schedule as a way of measuring or determining if a project was successful. The following objectives are identified:

- Identification of critical successful factors in construction projects.

- Evaluation of various success factors.
- Identifying the priority of success factors using rank analysis.

4. LITERATURE REVIEW

Ogwueleka (2011) presents the success factors are inputs to management system which can lead directly or indirectly to project success. It aims to investigate the critical success factors influencing project performance in Nigeria. The objectives are to identify success factors existing in projects and also to examine the important index of these success factors on project performance in Nigeria. Twenty-two success factors were selected from the literature for the research with sample size of 188 professionals. The data obtained from the questionnaire are analyzed using frequency and severity. The reliability test on the data using Crobach's alpha displays, sixteen success factors were necessary for true satisfaction of successful project implementation in Nigerian Construction Industry. Based on the result, objective management, management of design, technical factors, top management support and risk management were selected as the most critical success factors in project performance. The findings are focused to assist practitioners' gain better understanding on the key areas based on prioritized success factors in order to improve performance in project delivery.

Divakar and Subramanian (2009) reveal about the time management of construction projects is a very onerous task. Scheduling of construction projects is based on uncertainties. Projects face a time overrun ranging from few days/weeks to years. Identification of the factors which govern real-time monitoring of construction projects becomes very essential. This paper deals with the identification of critical factors with regard to the management aspects of the project that are responsible for the causes of delay at various stages. These factors include practical difficulties faced by the builders, project engineers and project managers. The factors identified to be critical are the. The proper management of these factors will definitely aid to achieve best project performance results.

Arslan and Kivrak (2008) explain about the achieving success is a highly critical issue for the companies to survive in a competitive business environment. The construction industry is also an area where there is strong competition due to a large number of construction contractors. There have been many factors such as qualified employees, quality workmanship and financial management that can lead to company success in the construction industry. The aim of this study was to investigate the critical factors leading to construction company success. Within this context, a survey was carried out among 40 Turkish construction companies which are located in the Northwest region of Turkey. In this survey, top-level managers and owners of the companies were interviewed. The interviews took place over a five month period between January and May 2007. Finally, the ranking of the critical success factors has been determined by using the Simple Multi Attribute Rating Technique (SMART). Based on the results, business management, financial conditions and owner/manager characteristics were determined as the most important factors to company success.

Takim and Adnan (2008) explain about the project effectiveness measures are normally used by most researchers and practitioners to judge project performance and project success. This paper provides an empirical analysis of measures of success in terms of effectiveness

performance in the development of construction projects in Malaysia. A survey was conducted in Malaysia among the four project stakeholders: the Government, private clients, consultants, and contractors. In total 93 respondents completed the questionnaire. Lists of effectiveness of success measures were identified for the respondents to identify their level of success criticality to the Malaysian construction projects. The data were analysed by means of statistical analysis i.e. ranking of variables based on the mean values, Analysis of Variance (ANOVA) and factor analysis techniques. The first finding revealed that the level of success criticality with regards to project efficiency performance in the development of construction projects in Malaysia is according to the specific requirements and priorities of different project stakeholders. The second finding shows that effectiveness measures are related to the project 'results' achieved in the development of construction project. These are represented by the five principal factors namely: Learning and Exploitation; Client Satisfaction; Stakeholder Objectives; Operational Assurance and User Satisfaction. It is anticipated that the findings reported in this paper could be important for future strategies and guidelines for the development of projects in Malaysia.

5. SUCCESS FACTORS INFLUENCING PROJECT PERFORMANCE

Various project success factors have been identified in different projects around the world. Community involvement, project objectives, technical innovation, uncertainty, politics, schedule duration urgency, financial contract, legal factors and implementation process were established as the critical success factors in projects (Morris and Hughes, 1987 [24]). Shamas-ur-Rehman and Ogunlana (2009) [33] studied in critical success factors in large scale construction projects in Thailand. Their study emphasized that success factors vary across various projects. Their findings revealed project planning and control, project personnel and involvement of client as critical factors influencing project success. Ann et al. (2006) [39] in their study, investigated on CSFs in construction project briefing. Briefing process is prerequisite to achieving success in project performance. This process involves the interpretation of clients' actual views and requirements to project participants. Their study considered open and effective communication, clear and precise briefing documents, clear intention and objectives of client and clear project goal and objectives as critical success factors. Ugwu et al. (2007) [37] identified nine top critical success factors that would act as enablers for successful implementation of ICT projects in construction as cost of development, top management support, availability of appropriate tools, development team knowledge and understanding of construction processes, ease applications, clear definition and understanding end user, clear communication, standardization issues and change management of organization level. Marterella (2007) [21] reviewed over 50 business processes and disclosed eight critical sales success factors influencing business performance as selection, performance management, skills assessment, defined solution offerings, demand creation, qualifying, proposal clarity and existing client expansion. Park (2009) [30] investigated a set of ten common factors and 188 individual factors influencing whole life performance of South Korean projects.

The study was focused on identifying the most critical individual factor in each common factor. The result identified the following individual factors in each common factor; clarity of contract, fixed construction period, precise project budget estimate, material and quality, mutual and trusting relationships, leadership and team management, then finally management of work safety on site.

Table. 1 Summary of literature reviews

Success Factors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Community Engagement	X									X							
Objective management	X	X	X				X		X		X	X					X
Technical factors																	
Uncertainty/risk management	X						X					X					
Commitment of participants	X	X							X			X					
Financial support			X			X					X						X
Legal factors				X													
Interface towards surrounding projects					X	X											
Top management support			X			X	X	X	X			X		X	X		
Availability of Manpower					X			X			X						
Communication channels				X			X			X		X					
Project organization				X		X		X	X							X	
Performance management	X													X			
Demand creation					X												
Resolution											X						
Precise project budget estimate			X				X										X
Nature and market conditions	X																
Stakeholder management	X				X						X			X		X	X
Stable framework condition	X		X		X												
Design management																	
Project planning and control	X		X			X					X			X		X	X
Environmental factors/politics	X		X						X								
Mutual relationship					X								X				X
Innovation concept	X			X				X	X								
Contract strategy	X			X													X

(1) Morris and Hughes (1987) [14], (2) Ugwu et al. (2007) [22], (3) Marterella (2007) [13], (4) Park (2009) [17], (5) Iyer and Tha (2006) [11], (6) Belassi and Tukei (1996) [4], (7) Gartner group (2004), (8) Pinto and Kharbanda (1995) [18], (9) Cleland and King (1983) [6], (10) Boyer et al. (2008) [5], (11) Clarke (1999) [8], (12) Cooke-davie (2002) [9], (13) Muller (2005) [15], (14) Rockart (1979) [19], (15) Shamas-ur-rahman (2009) [20], (16) Ann et al. (2006) [3], (17) Arain (2007) [2].

6. METHODOLOGY

The study adopted field survey as a method methodology to uncover critical success factors influencing project performance in Construction Industry. Surveys through questionnaires are found effective because of the relative ease of obtaining standard data appropriate for achieving the objectives of this study. Based on the literature cited, seventeen success factors are selected. The study is conducted by developing a questionnaire and collecting the response from construction experts. Questionnaires are framed for the survey based on identifying the success factors. In detailed questionnaires are floated to Engineers, Site Engineers, Contractors and the responses are collected.

The questionnaire required the respondents to rank their answers using five-point scale. For frequency index, the values are represented as follows: 0 = Not important, 1 = very less important, 2 = less important, 3 = important, 4 = high important, 5 = very high important.

5.1 Preparation of Questionnaire

The study will be conducted by developing a questionnaire and collecting the response from construction experts. To identified the success factors and based on the questionnaires are framed for survey. Detailed study questionnaires are floated to Engineers, Site Engineers, Contractors and the responses are collected

- Questionnaire is prepared to address the possible factors causing success in construction projects.
- The questionnaire is organized in a form, where priority scaling can be done.
- The questionnaire contains:
    - Personal details of respondent,
    - Project success criteria and
    - Time and cost over run factors.
- This study focused on three main groups who are working in construction project.
- These groups comprised of:
    - Architects, Engineers / Quantity Surveyor officers working in different offices.
    - Site Engineers such as Project Engineers, Asst. Project Engineers, Junior Engineers etc. posted at site.
    - Contractors.
- It was planned to collect data of minimum 10 completed projects to identify the success factors.
- It was planned to Study Technical Examination branches observations. Audit reports etc. to identify the problem areas in projects.

5.2 Data Analysis

Seventeen factors are identified as project success factors and thirty three individual factors are identified as time and cost overrun factors. This over run factors are arranged under eight major topics. Based on this questionnaires are framed for survey. Detailed questionnaires are floated to Engineers, Site Engineers, Contractors and the responses are collected.

Responses are manually analysed by weighted average method, Chi- square test, Spearman's Rank correlation. Responses are also analyze by using software SPSS 17.

5.3 Characteristics of Respondents

The study are grouped into three profession of respondent and targeted 20 companies in order to obtain equal representation of the entire groups. The survey was carried out within a period of five months from November to March, 2013.

Table. 2 Demographic Data of Respondent

	Frequency	Percent %
Profession of Respondents (N = 96)		
Engineers	31	32.3
Site engineers	43	44.8
Contractors	22	22.9
Years of working Experiences (N = 96)		
< 2 years	38	39.6
2-4 years	34	35.4
Above 4 years	24	25.0
Respondents on the basis of represent		
Govt. Department	37	38.5
Client private work	19	19.8
Contractor	40	41.7
Type of projects involvement (N =96)		
Building and Industrial projects	34	35.4
Bridge and road projects	42	43.8
Both	20	20.8

7. RESULT AND DISCUSSION

The response for various success factors are shown in table. 3

$$\mathbf{W_a} = (0*0) + (0*1) + (0*2) + (2*3) + (4*4) + (25*5)/\ 31 = 4.74$$

Table. 3 Distribution of Respondents

Sl. No	SUCCESS FACTORS	ENGINEER							SITE ENGINEER							CONTRACTOR						
		0	1	2	3	4	5	W_a	0	1	2	3	4	5	W_a	0	1	2	3	4	5	W_a
1	Project completed on time	00	00	00	02	04	25	**4.74**	00	00	00	02	03	38	**4.81**	00	00	00	02	03	17	**4.66**
2	Project completed within budget	00	01	01	03	06	20	**4.39**	00	00	01	02	06	34	**4.61**	00	01	01	01	05	14	**4.30**
3	Users of the project are satisfied	00	00	01	03	06	21	**4.52**	00	00	00	02	08	33	**4.70**	00	00	00	02	04	16	**4.67**
4	Meeting the Specifications	00	00	00	02	05	24	**4.71**	00	00	00	03	06	34	**4.70**	00	00	00	02	04	16	**4.67**
5	Quality in construction	00	00	00	01	02	28	**4.87**	00	00	00	01	03	39	**4.08**	00	00	00	01	02	19	**4.82**
6	Recognition earned by the project	01	01	01	07	09	12	**3.87**	01	00	02	10	16	14	**3.91**	01	00	01	04	07	09	**3.95**
7	Health, safety and zero accident	00	01	02	06	11	11	**3.93**	00	01	02	09	14	17	**4.00**	00	00	01	04	08	09	**4.16**
8	Technical Performance	00	01	01	02	05	22	**4.48**	00	00	02	02	05	34	**4.65**	00	00	01	02	04	15	**4.50**
9	Profitability	01	01	02	06	08	13	**3.87**	00	03	02	14	17	07	**3.56**	00	01	02	05	06	08	**3.82**
10	Risk management & mitigation of risk	01	02	02	07	10	09	**3.61**	01	02	02	10	15	13	**3.74**	00	00	01	04	05	12	**4.27**
11	Management of variations and change orders	01	01	02	08	11	08	**3.64**	01	02	03	10	13	14	**3.70**	01	01	02	06	08	04	**3.47**
12	Efficiency of the project management process	00	00	01	04	10	16	**4.32**	00	01	00	06	20	16	**4.10**	00	00	00	03	08	11	**4.36**
13	Functionality or fitness for purpose	00	00	01	05	10	15	**4.26**	00	01	02	07	18	15	**4.02**	00	00	00	03	08	11	**4.36**
14	Cooperation among the project participants	01	01	01	06	10	12	**3.90**	01	01	02	08	17	14	**3.08**	00	00	01	05	06	10	**4.16**
15	Personnel Development of the participants	01	04	03	05	08	10	**3.71**	02	06	04	08	12	11	**3.28**	01	02	03	06	06	04	**3.16**
16	Acceptance of the project by the community	01	01	01	06	10	12	**3.90**	01	01	03	08	15	15	**3.80**	00	00	01	05	08	08	**4.04**
17	Environmental Sustainability	00	00	01	07	10	13	**4.11**	00	01	01	10	16	15	**4.00**	00	00	01	04	08	09	**4.16**

The relative importance of one factor over another is calculated from the respondents are shown in table. 4

$\sum WX = (0*0) + (0*1) + (0*2) + (6*3) + (10*4) + (80*5) = 458$

Where W= Weight age of each factor

X= No of respondent of project success

Weighted Average RIW = $\sum WX$ / Total no of respondent = 458/96 = 4.77

Table. 4 Calculation of Weighted Average of Different Success Criteria

SL. NO	Factors for Project Success	Weight age of each factor						∑WX	Weighted Average RIW
		0	1	2	3	4	5		
1.	Project completed on time	00	00	00	06	10	80	458	4.770
2.	Project completed within budget	00	02	03	06	17	68	434	4.520
3.	Users of the project are satisfied	00	00	01	07	18	70	445	4.635
4.	Meeting the Specifications	00	00	00	07	15	74	450	4.690
5.	Quality in construction	00	00	00	03	07	86	467	4.865
6.	Recognition earned by the project	03	01	04	21	32	35	376	3.914
7.	Health, safety and zero accident	00	02	05	19	33	37	386	4.021
8.	Technical Performance	00	01	04	06	14	71	438	4.552
9.	Profitability	01	05	06	25	31	28	356	3.708
10.	Risk management & mitigation of risk	02	04	05	21	30	34	367	3.823
11.	Management of variations and change orders	03	04	07	24	32	26	348	3.625
12.	Efficiency of the project management process	00	01	01	13	38	43	409	4.260
13.	Functionality or fitness for purpose	00	01	03	15	36	41	401	4.177
14.	Cooperation among the project participants	02	02	04	19	33	36	381	3.967
15.	Personnel Development of the participants	04	12	10	19	26	25	324	3.373
16.	Acceptance of the project by the community	02	02	05	19	33	35	378	3.938
17.	Environmental Sustainability	00	01	03	21	34	37	391	4.073

Table.5 Rank of the different project success factors

Rank	Factors for Project Success	Weighted Average RIW
1.	Quality in construction	4.86
2.	Project completed on time	4.77
3.	Meeting the Specifications	4.69
4.	Users of the project are satisfied	4.63
5.	Technical Performance	4.55
6.	Project completed within budget	4.52
7.	Efficiency of the project management process	4.26
8.	Functionality or fitness for purpose	4.17
9.	Environmental Sustainability	4.07
10.	Health, safety and zero accident	4.02
11.	Cooperation among the project participants	3.96
12.	Acceptance of the project by the community	3.93
13.	Recognition earned by the project	3.91
14.	Risk management and mitigation of risk	3.82
15.	Profitability	3.70
16.	Management of variations and change orders	3.62
17.	Personnel Development of the participants	3.31

6.1 Discussion on Findings of Success Factors

An interesting result is that the top five ranking factors are somewhat same for each group. They are

1. Quality in construction
2. Project completed on time
3. Meeting the specifications
4. Users of the project are satisfied or needs of the user's are fulfilled
5. Technical performance

All the three groups ranked the factor 'Quality in construction' as the most important factor for a project success because quality in construction has become a serious issue for the construction projects in Government sector.

8. CHI – SQUARE TEST

The Chi-square test are given a set of observed frequencies obtained under some experiment and want to test if the experimental result support a particular hypothesis or theory.

The steps involved chi-square tests are as follows:

- Observed frequencies O are tabulated.
- Expected frequencies E are calculated.
- The difference between observed and expected frequencies are obtained and square of these difference are tabulated $(O-E)^2$.

- The values of $(O-E)^2$ obtained in step 3 are divided by the respective expected frequency and the total $(O-E)^2 / E$ is obtained.
- The calculated of ψ^2 is compared with the table value of ψ^2 for given degree at a certain level of significance (generally 5% or 1% level selected).

By degrees of freedom we mean the number of classes to which the value can be assigned arbitrarily if at the 5% or 1% level of significance the calculated value of ψ^2, the difference between theory and observation is considered to be significant. On the other hand, the calculated value of ψ^2 is not considered as significant i.e., it is regarded as due to fluctuations of sampling and hence ignored.

$$\psi^2 = \sum (O - E)^2 / E$$

O – Observed frequency, E – Expected frequency

Table .6 Responses of Three Groups for Various Success Factors

This table explains the rank of each success factors and total rank value.

GROUPS	Not Important	Very Low Important	Low Important	Important	High Important	Very High Important	Total
Engineer	7	14	20	80	135	271	527
Site Engineer	7	19	26	112	204	363	731
Contractor	3	5	15	59	100	192	374
Total	17	38	61	251	439	826	1632

Null Hypothesis H_0 : There is no significant difference between three groups.

Alternate Hypothesis H_A: There is significant difference between three groups.

Calculated value of Chi- Square = 80.08

Degree of freedom = (R-1) x (C-1) = (3-1) x (6-1) = 10

R= No of groups (3)

C= No of weight age factors (6)

Tabulated value of Chi-Square = 18.3 (At 0.001 level of significance)

Calculated value (80.08) < Tabulated value (18.3)

The null Hypothesis is rejected and alternate is accepted.

So there is no significant difference between three groups.

Table. 7 Calculation of Coefficient of Rank Correlation for Cross Comparison

Sl.No	Groups	Co Efficient of Rank Correlation
1	Engineers and site Engineers	0.950
2	Site Engineers and Contractors	0.933
3	Contractor and Engineers	0.890

- The response shows that there is a greater agreement between Engineers and Site Engineers (Coefficient of rank correlation 0.950)
- There is a agreement between Site Engineers and Contractors (Coefficient of rank correlation 0.933).
- Also an agreement between Contractors and Engineers (Coefficient of rank correlation 0.890)
- However, a particularly interesting result is that the top five ranking factors are somewhat same for each group.

9. CORRELATION OF FACTORS ANALYSIS

The purpose of data reduction is to remove redundant (highly correlated) variables from the data file, perhaps replacing the entire data file with a smaller number of uncorrelated variables. The purpose of structure detection is to examine the underlying (or latent) relationships between the variables.

Factor analysis is also used to understand the interdependence among the attributes.

- The Bivariate Correlations procedure computes the pair wise associations for a set of variables and displays the results in a matrix.
- It is useful for determining the strength and direction of the association between two scale or ordinal variables.

Project Success Factors

Table. 8 Correlation Between Pre Construction Phase Factors.

Correlations				
		Project completed on time	Project completed with in budget	Quality in construction
Project completed on time	Correlation	1	.886**	.828**
	Sig. (2-tailed)		.000	.000
	N	96	96	96
Project completed with in budget	Correlation	.886**	1	.720**
	Sig. (2-tailed)	.000		.000
	N	96	96	96

Quality in construction	Correlation	.828**	.720**	1
	Sig. (2-tailed)	.000	.000	
	N	96	96	96
**. Correlation is significant at the 0.01 level (2-tailed).				

According to the analysis the Pearson correlation values are positive so there is a positive correlation between the pre construction phase factors.

Table. 9 Correlation between Post Construction Phase Factors

Correlations							
		Users of the project are satisfied	Recognition earned by the project	Profitability	Functionality or fitness for purpose	Acceptance of the project by the community	Environmental sustainability
Users of the project are satisfied	Correlation	1	.824**	.761**	.757**	.803**	.757**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	96	96	96	96	96	96
Recognition earned by the project	Correlation	.824**	1	.899**	.884**	.955**	.938**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	96	96	96	96	96	96
Profitability	Correlation	.761**	.899**	1	.870**	.903**	.879**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	96	96	96	96	96	96
Functionality or fitness for purpose	Correlation	.757**	.884**	.870**	1	.907**	.920**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	96	96	96	96	96	96
Acceptance of the project by the community	Correlation	.803**	.955**	.903**	.907**	1	.945**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	96	96	96	96	96	96
Environmental sustainability	Correlation	.757**	.938**	.879**	.920**	.945**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	96	96	96	96	96	96
**. Correlation is significant at the 0.01 level (2-tailed).							

According to the analysis the Pearson correlation values are positive so there is a positive correlation between the post construction phase factors.

10. CONCLUSIONS

The survey of Engineers, Site Engineers and Contractors as discussed in this study are related to the Construction Projects. The survey focused on identifying and ranking in order of importance, the main factors for project success and the factors causing project delay and cost overrun. Seventeen factors were identified for project success and ranked according to the importance. The result of the survey indicates that all the three groups felt that quality of project construction must be improved along with other sixteen factors for project success.

The other major outcomes of this study are considerable importance must be given for the area of pre-project planning and the same will improve the chances of success in construction projects. Department must ensure that estimates are prepared sufficient early and accurately. Department must ensure to incorporate all necessary suggestions/requirements of the users during planning stage itself by proper liaison and also conduct proper soil investigation before tender action. Department must create a system for transferring experience or knowledge between projects. A new strategy must be introduced for the selection of contractors other than the present system of lowest tendered at least for important projects.

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