A STUDY ON FACTORS INFLUENCING QUALITY IN CONSTRUCTION

S.SINDHUJA
CONSTRUCTION ENGINEERING AND MANAGEMENT
T.S.M. JAIN COLLEGE OF TECHNOLOGY

ct—
ction projects play a vital role in the development of ion. Quality is one of the important features in all . Success parameter in construction greatly depends quality performance. In construction projects lack of results in delays cost overrun and unsafe structure. search mainly focuses on identifying and scrutinizing ors that affects quality in construction. From literature he main factors that affect quality of construction is A questionnaire survey is to be carried out in various nies and rank them by Relative Importance Index. hat data's the major factors that affecting the quality o be identified. Then conduct T-test using SPSS e to analyze the data to find out the significant ce between the ranking of contracting and consulting nies towards the importance of quality factors. Finally he results suitable suggestions was given to the nies for improving their product quality.

NTRODUCTION

1.1 GENERAL

Quality is one of the important aspects of all ts. The level of success of construction ts greatly depends on the quality mance. Quality in construction cannot exist t a project and a construction project cannot

functional areas. These wastages can be ac by maintaining quality throughout the project been seen that the quality and customer s offered by an enterprise plays a crucial role survival and success of an enterprise und existing environment. Quality is a key to a n economy. It is an essential requirement f product. The quality of an engineering produ therefore be measured in terms of num characteristics that contribute to an performance which satisfies cust requirements; this is termed as perfor characteristics.

Quality policy is the overall intention directions of an organization as regards to as formally expressed by top management. management is all activities of the management function that determine the policy, objectives and responsibilities implement them by means such as quality pla quality control, quality assurance and improvement within the quality system. Management Body of Knowledge (PMBOK), a

nenting quality management.

1.2 MEANING OF QUALITY

Quality is customer satisfaction," "Quality is
s for Use".

he American National Standards Institute
, British Standard Institution and the
can Society for Quality (ASQ) define quality

The totality of features and characteristics
roduct or service that bears on its ability to
y given needs

1.3 QUALITY PERSPECTIVES SITE

veryone defines Quality based on their own
ective.

udgmental perspective"goodness of a
ct." Examples of products attributing to this
Rolex watches, Lexus cars.

Product-based perspective "function of a
c, measurable variable and that differences in
reflect differences in quantity of some
t attributes."

User-based perspective "fitness for intended
ndividuals have different needs and wants,
ence different quality standards.

alue-based perspective "quality product is the
at is as useful as competing products and is
a lesser price."

Manufacturing-based perspective "the
ble outcome of a engineering and
acturing practice, or conformance to
cation."Example: Coca-cola — "quality is
manufacturing a product that people can
d on every time they reach for it."

4 DIMENSIONS OF QUALITY

stated conditions of use.

• Conformance: the degree to which pl
and performance characteristics of a p
match pre-established standards.

• Durability: the amount of use one get
a product before it physically • deteriorates o
replacement is preferable.

• Serviceability: the speed, courtesy
competence or repair.

• Aesthetics: how a product looks,
sounds, tastes or smells.

• Perceived quality: subjective asses
resulting from image, advertising or brand nar

1.5 QUALITY SYSTEM IN CONSTRU INDUSTRY

The construction indus
typified by highly differentiated, fragmente
loosely structured system. The skills, loyal
orientation of professionals and practition
the industry have developed in an environm
specialization, differing traditions and
opposing interests at integration, if an
presently weak. Developing a quality system
first step towards improving qualit
construction industry. A quality system cons
the following (Nee, 1996):

- Quality policy
- Organization structure
- Procedures
- Processes
- Training
- Quality manual

1.6 TYPES OF SURVEY RESPONSE SCA

When designing surveys, there t

choices that are diametrically opposed to each other. Some examples would be:

"Yes" or "No"

"True" or "False"

"Fair" or "Unfair"

"Agree" or "Disagree"

There's no chance for nuance in a response, and there's no way for a respondent to be neutral. But there's actually a lot of value in the lack of a neutral option.

Sometimes, especially in long surveys, you're subject to what's known as the error of central tendency when answers gradually regress to the middle of the scale, or the neutral options. A dichotomous scale will give you a clearer, binary answer, but can also fall prey to fatigue — respondents then tend to lean toward positive answers.

1.6.2 Rating Scales

Rating scales are probably what you're most familiar with. "On a scale of 1-10, how satisfied were you with our service today?"

The three most common rating scales are:

1-10 scale

1-7 scale

Likert scale (1-5)

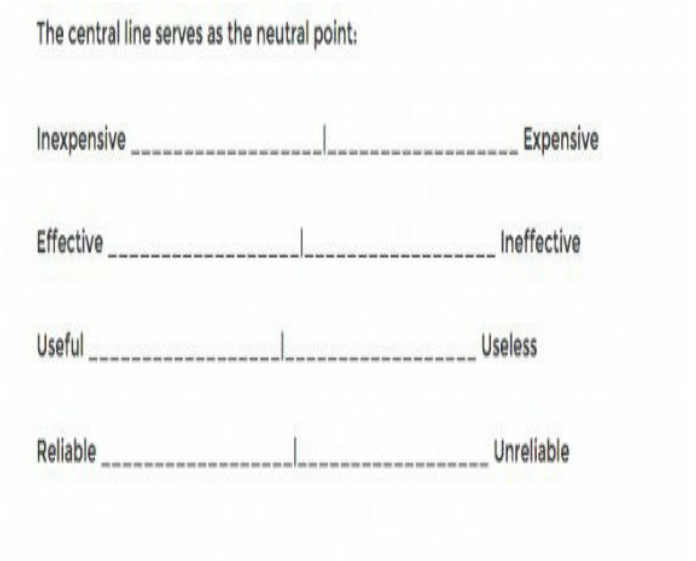
Is there a difference in the outcome based on which scale you choose? Totally. There's more variance in the larger scales, so the norm is to use the Likert scale.

The most common, then, is the Likert scale. Dr. Rob Balon advises to "always use the 1-5 scale with 5 being the

:1.6.3 Semantic Differential Scal

I. Semantic differential sc

gather data and "interpret based on the conno meaning of the respondent's answer." Thes usually have dichotomous words at either e the spectrum. They generally measure specific attitudinal responses, such as following:



1.7 FACTORS AFFECTING QUAL

The identified factors from literature review are

- Design
- Contractor
- Subcontractor
- Owner
- Project
- Material

Financial issues

Execution

1.8 OBJECTIVES

The objectives of the present study are

To identify various factors affecting the quality performance of construction projects

To rank them by degree of importance

To improve products quality

To minimize the rework

Helps to meet the customer requirements.

1.9 NEED FOR THE STUDY

Generally quality is essential for every product.

Development in construction projects develops the nation.

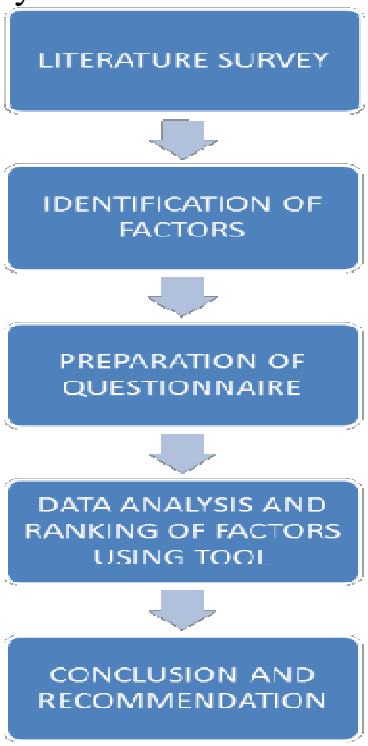
Quality in construction is very essential to increase end user satisfaction.

To increase end user satisfaction ,study and analyses of the factors influencing quality in construction becomes necessary.

2. METHODOLOGY

methodology adopted in this study is ollection of data by the method of survey. al methods for collecting information the industry were evaluated from various ures. The flowchart represents the

affecting the quality have to be identified. from the results suitable suggestions have given to the companies for improving their p quality.



3. QUESTIONNAIRE DESIGN

A through literature review was initially con to identify the factors that affect the qua construction projects as a whole. Based on factors the questionnaire for the survey prepared. The questionnaire is divided into two The first part consists of general informatio Name of respondent, Designation, Company Type of the project and the second part consis quality influencing factors for evaluation

3.1 QUESTIONNAIRE SHEET

INTRODUCTION

This survey is a part of a study of factor influ quality in construction. The main objective survey is to determine the factor affecting qua construction. The information obtained will be

ve of this survey is to determine the affecting quality in construction. The ation obtained will be used for research se only and no attempt will be made to identify dividual or organization.

GENERAL INFORMATION

Name of the company :
Status of the company :
Address of the company :
Size of the company (number of yees):
Annual turnover :
Age of the company :
Name of the respondent :
Position of respondent in the company:
Contact no :

IDENTIFIED FACTORS

identified factors from the review are

ct	- Location of the project - Site access
gn	- Drawings are prepared in full details - Conformance to codes and standards
act	- A written contract with clear conditions - Using a standard contract Types of awarding system
rial	- Using a comprehensive material management system - Availability of good quality construction materials
r	- Labor management system - Training courses for labor
me	- Availability of equipment - Equipment maintenance
ont rs	- Company's procedures of selecting subcontractors
Site staff	- Cooperation between Supervision and Contractor's staff - Understanding of contract administration by Supervision
Executio n	- Using integrated project execution system - Testing for final products
Financia l Issues	- Amount of contractor's cash flow - Non-delay of interim payments
Owner	- Owner's quick response (no delays in making decisions) - Owner's contribution to desig

5 . RELIABILITY OF DATA

Prior to data analysis, the reliab data is done using Cronbach's Coe Alpha Method, in SPSS software wh commonly used to estimate the reliab data. Reliability scores are analysed fr respondents given from the survey Cronbach's alpha obtained for respond given in Table I.

Table 2 - RELIABILITY STATISTICS

Cronbach's Alpha	0.791
No of Items	50

Cronbach's alpha value is 0.7 value must be in the range of 0.6 t the data has to be reliable. Hence analysis the data values reliable.

5.1 DATA ANALYSIS

A Questionnaire survey is con through post and field survey. Fro survey 75 responses were received. data are analyzed using Relative Im Index method. Ranks are provided

PSS analysis techniques is to
e clear and non-technical formats for
on statistical procedures .It is also, because it
ely available and covers a broad spectrum of
ical
dures.

ASSESSMENT METHOD

Five point scale

1 – strongly agree , 2 – Agree , 3 – moderate , 4 – disagree , 5 – strongly disagree.

ANALYTICAL TOOL

Relative Important Index

This method is used to find the contractor , owner and labor perceptions of the relative important of the identified quality factors.

RII = SW / AN

Where,

RII - Relative Importance Index,

W - weighting given to each factor by the ndents

(ranging from 1 to 5)

A - highest weight (i.e. 5)

N - total number of respondents

ATA COLLECTION AND DATA ANALYSIS

7.1 DATA ANALYSIS

Primary questionnaire helps in obtaining lation regarding the demographic details of spondent. The demographic details include of the respondent, age of the respondent, ence of the respondent and designation of

according to the degree of importance impact; 2 =Low impact; 3 =Average impact; impact; 5 =Very High impact). For analyzin SPSS 20, statistical analysis software was use

7.1.1 MODE OF ANALYSIS

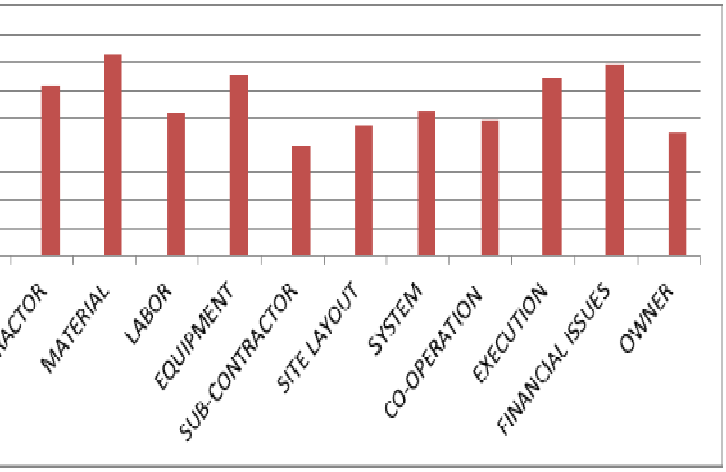
Analysis of data is done SPSS software the result obtained ca obtained by using SPPSS software

MEAN AND RANK

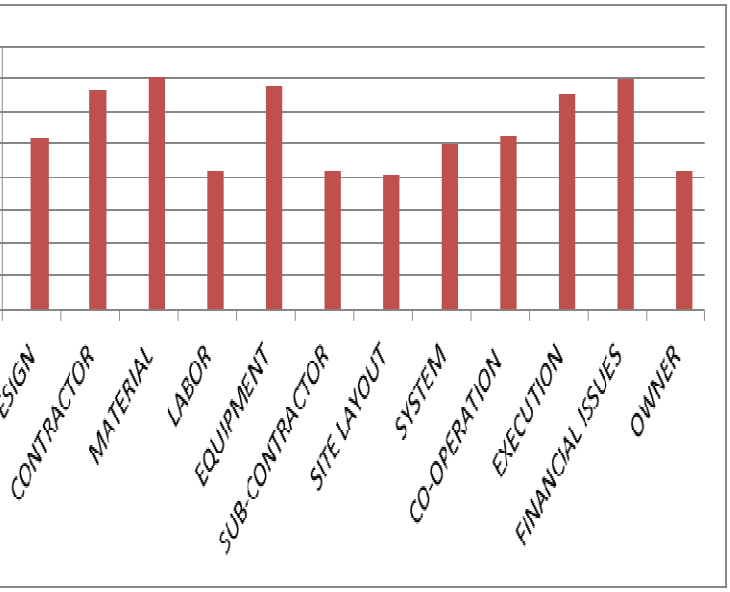
MAJOR FACTOR	CONTRACTOR		CONSULTANT		OV
	MEAN	RANK	MEAN	RANK	MEAN
DESIGN	0.551	6	0.524	7	0.492
CONTRACTOR	0.617	5	0.665	4	0.632
MATERIAL	0.728	1	0.706	1	0.684
LABOUR	0.52	7	0.2	10	0.492
EQUIPMENT	0.66	3	0.677	3	0.68
SUB-CONTRACTOR	0.402	12	0.42	11	0.405
SITE LAYOUT	0.42	10	0.40	12	0.377
SYSTEM	0.524	8	0.50	8	0.528
CO-OPERATION BETWEEN PARTIES	0.495	9	0.525	6	0.565

APH OF MEAN RII

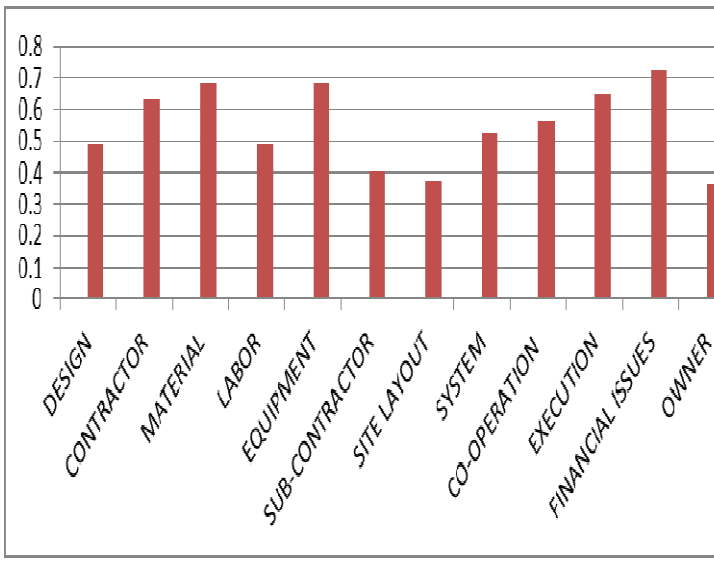
- MEAN RII OF CONTRACTOR



- MEAN RII OF CONSULTANT



The secondary questionnaire is used to find major factors affecting labor productivity. 45 factors are used for the preparation of questionnaire. 5 point Linker scale is used for t measurement :(1=No impact; 2 =Low



7.2 INDEPENDENT T-TEST FOR RESP AGREEMENT

The t-test was conducted to find if there is significant difference between the ranking contracting and consulting companies toward importance of quality factors. T-test was carrie on the average weighted factors resulted fr ranking the factors affecting quality. It is impo to check whether there are differences in the vi respondents or not. So for this reason indepen t-test was conducted

The data collected from the respo are analyzed using SPSS software.

8. RESULTS AND DISCUSSIONS

Questionnaire was collected from v nature of projects such as;

TABLE-5 INDEPENDENT T-TEST RESULT

CATEGORIES	t-test	P-va
Contractor - consultant	1.742	0.0

NCLUSION

Construction projects play a significant the development of any country and quality of the important factors in the success of the uction industry. There is a lack of standing of quality is the problem in the uction industry Construction industry is a ide and big industry that allow any state to ry fast development to the whole country in of infrastructure and capital income. uction industry requires the involvement of to ensure that the construction projects are in the right path. Many literatures are ed and the major factors affecting the quality nstruction is identified. Based on that onnaire are prepared and distributed to the 35 anies and 25 were successfully received. that data by using relative important index d RII is identified and ranking were provided major factors.

From that result we conclude that the top 5 factors that affect the quality of uction in the view of respondents like ctor, consultant and owner are Materials, cial problems, Method of execution, ment, Problems in contractor side. The ndents observed that the quality of raw als, conditions and Usage of equipment , d of execution of work, Financial issues and contractual problems are the main affecting causes

RECOMMENDATION

1. All the materials procured for the const should be undergo quality check before procurement.
2. All the procured materials should be properly.
3. Material inventories should be c periodically to avoid over stocking or def of material.
4. Make timely delivery of material to the sit
5. Equipment should be checked f correctness before procure.
6. Equipment should be maintained proper make service periodically.
7. Equipment should be used for it utilization.
8. Use proper method of execution of work.
9. Make field test before and after the work.
10. Owners should contribute in design.
11. Owners should make the payments at c time.
12. Avoid financial problems.
13. Make timely payments to the labors.
14. Co-operation between parties is important.
15. Proper communication between contr and clients.

Maintain the site layout clean.

11 . REFERENCES

[1] K.S.Shobana and D.Ambika ., "Evaluation of Factors Affecting Quality in Construction Projects" , Vol. 5, Issue 3, March 2016

[2] Hamzah Abdul-Rahmana, Samiaah M. Hassen Al-Tmeemyb , Zakaria Harunc, Mei Ye, Khod., "The major causes of quality failures in the Malaysian building construction industry".

[3] Teena Joy., "A Study on Factors Influencing Quality of Construction Projects" ,Vol 3 Issue 5 May, 2014

[4] Davidkumar.C , Kathirvel.P., "A Study on Factors Influencing Quality of Construction Projects" , Volume 3 Issue V, May 2015

[5] Chan, A.P and Tam, C.M., "Factors affecting quality of building projects in Hong Kong", International Journal of Quality and Reliability Management, Vol.17 Nos. 4/5, PP.423-441, 2000.

[6] Abdel-Razeq, R.H., "Factors Affecting Construction Quality in Egypt: identification and relative importance", Journal of construction and Architectural Management. Vol.3, PP. 220-227, 1998.

[7] McCabe, S., "Quality Improvement Techniques in Construction", Addison Wesley Longman Limited, 1998.

[8] El-Sawah, H., "Quality Management Practices in the Egyptian Construction Industry", International Exhibition Conference for Building & Construction, Egypt, 1998.

[9] Project Management Institute, "A Guide to the Project Management Body of Knowledge", 2000.
http://www.pmi.org/info/pp.standardsexcerp

Criteria and Impacting Factors", Intern Journal of Quality &Reliability Manag Vol.12, No.5, PP. 18-37, 1995.

[12] Abas.M, Khattak.S.B, Hu Maqsood.S, Ahmad.I, "Evaluation of F affecting the Quality of Const Projects", Technical Journal, Univers Engineering and Technology (UET) Pakistan, Vol.20, pp.115-120, 2015.

[13] Dr. Abdulsalam Zidan, "Factors Af Design Quality in Construction Indu Syria", Damascus University Journal, pp.47-48, 2013.

[14] N. Ahzahar.N, Karim.N.A, Hassa Eman.J, "A Study of Contribution Fact Building Failures and Defects in Constr Industry", Elsevier, Vol.20, pp.249-255, 2

[15] Albert P. C. Chan, David Scott and A L. Chan, "Factors affecting the succes construction project", Journal of constr engineering and management, V pp.153-155, 2004.

[16] Arunmozhi.S, Suguna.K, Raghuna "A study on quality performance in b construction projects", International of engineering sciences & manag Vol.5, pp.31-36, 2015.