



## ASSESSMENT OF CRITICAL CHECKS IN THE MASTER CHECKLIST

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### ABSTRACT

The construction industry has been struggling with quality issues for many years, which affect the cost, customer satisfaction and business development. This paper focuses on identification of prerequisite for Quality control of selective activities. This study leads to find out vital checks in activity which requires more concentration while execution. This study carried out a survey for finding critical checks for selective activities. ISO certified organization and their middle management employee responded to master checklist. This data analysis forms a unique trend of vital, important and necessary checks.

Study concluded with the Vital checks in activity for quality concern, study is carried out by questionnaire survey, checklist ratings and views. This solution will be unique one for construction industries for improving quality of the work.

*Key Words* — Selective activities, Vital checks

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### INTRODUCTION

Quality is the main issue encountered in construction industry, in present scenario. More numbers of entities are involved or introduced in construction and development. As involvement is adding in present, it is going to hamper the quality due to technical illiteracy, adoption of conventional methods, more number of alternatives to choose from and ever increasing competition. Lack of quality in construction may not attract the customers and hence price drop i.e. dropdown of profit may be the option to be adopted for customer attraction. An organization cannot afford to lose its customer as it creates a negative image of the

organization. Hype about its negativity is created among customers which directly affects productivity. Though neglecting quality may reduce the time for construction which is one of the aims of this sector, but the desired result may not be pleasant. Completing project on scheduled time one should not mess with quality. If it is not possible to complete the project on time, quality controls should be implemented. One of the ways for achieving quality is by inspection. Procedure for inspection is preparation of checklists during operations. Checklist is the list of important actions or steps to be taken in specific order.

The Eight Selected activities are Excavation, Reinforcement, Formwork, Concreting, Brick Masonry, Flooring, Plastering, and Painting.

#### Factors Affecting to the Quality:

To maintain the quality throughout the project, following are the different factors affecting to the quality.

- 1) Money and Time
- 2) Material
- 3) Manpower
- 4) Machines and methods
- 5) Market
- 6) Management
- 7) Checklist
- 8) Customer satisfaction

#### DEFINITIONS

##### Definitions of Quality:

There are several definitions of quality which are given by the different Quality Guru's. They are as follows:

*"Quality is conformance to specification."*- British Defence Industry QA Panel

*"Quality is conformance to requirements."*  
- Philip Crosby

*"Quality is fitness for purpose."*  
- Dr. Juran

*"Quality is synonymous with customer needs and expectations."*

- RJ Mortiboys

*"Quality is a predictable degree of uniformity and dependability, at low cost and suited to the market."*

- Dr. Edward Deming

*"Quality is meeting the requirements of the customer – now and in the future."*

- Mike Robinson

*"Quality is the total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in user will meet the expectations by the customer."*

According to us, the definition of quality will be "Quality is the product which can be obtained by inspection so as to achieve customer satisfaction."

#### 1. Quality Control:

The dictionary defines Quality Controls the inspection, analysis and action required to ensure quality of output; the operational techniques and the activities used to fulfill and verify requirements

of quality; a procedure for keeping quality of inputs or outputs to specifications. (Lydia Nyomek et al. 2010).

#### 2. Quality Assurance:-

Quality assurance is about being "in control" of all major areas of your business so that you can assure quality. Being "in control" also reduces variation, which improves quality. "Control" and "variation reduction" is accomplished using various methods. (Lydia Nyomek et al. 2010).

#### 3. PQP- Project Quality Plan:

The project quality plan (PQP) defines the quality planning for the whole project and is the principle quality management system documentation prepared for the project.

This Project Quality Plan (PQP) is distributed using QDMS (Quality Document Management System) to manage distribution and control updates where server or internet access is difficult or not available, a manual form (A04.F06 Document Distribution Record) can be used, records details of the documents holders who will be updated. QDMS is a software package that is used for the purpose of formally recording document transmittals and receiver acknowledgments. Quality planning described in these documents shall apply to all activities of work for the project which may encompass the design (if applicable), site works, supply, installation testing and commissioning. This plan shall apply to the associated resources and facilities employed on project.

#### OBJECTIVES

- 1) To improve the quality of specific activity.
- 2) To identify the vital checks required for quality.
- 3) To assess checks involved in construction activities.

#### NEED OF WORK

Now-a-days, the Quality construction is very necessary for the following purposes:

- 1) Quality Control (QC) is very essential for a business Development.
- 2) Quality Control co-ordinates activities which direct control businesses with regards to quality.
- 3) Quality Control creates techniques and activities used to fulfill requirements for quality in business.

#### SCOPE OF WORK

- 1) Setting out objectives
- 2) Literature survey
- 3) Site Visits
- 4) Identification of critical activities and factors affecting to it
- 5) Finding importance of factor in terms of grade

#### LITERATURE REVIEW

##### 1. QUALITY GURUS

The movement of quality has been differentiated in the three groups of gurus since the 1940's:

Early 1950's Americans who took the messages of quality to Japan

Late 1950's Japanese who developed new concepts in response to the Americans

1970's-1980's Western gurus who followed the Japanese industrial success

**2.1. Nashwan Mohammed Noman Saeed (1) and Awad Sad Hasan(2)** *"THE EFFECT OF TOTAL QUALITY MANAGEMENT ON CONSTRUCTION PROJECT PERFORMANCE"* This study empirically examines the extent to which Total Quality Management (TQM) and project performance are correlated and the effects of TQM on project performance. In this study, a TQM framework is developed according to a comprehensive literature review. This framework demonstrates the relationship between TQM and construction project performance through examining the effects of nine TQM constructs on three element levels of project performance. The proposed model and hypotheses were tested by using data collected from Yemen construction firms. Then survey covered 40 companies chosen from construction sector (30% of sample size). 29 questionnaires were returned. The response rate was 72.5 %, normal for such research). The results of this aforementioned model support the proposed hypothesis (TQM has positive effects on teamwork satisfaction, quality of construction project implementation, client satisfaction, and construction project performance. Finally, this research culminates with TQM process for improving construction project performance, a discussion and the general conclusions are extracted in the light of the survey findings. The results finding are expected to provide useful information for future research directions especially as an indicator

for the development of a suitable TQM framework for the construction firms.

**2.2. Sugumaran B, Lavanya M.R** *"EVALUATION OF CRITICAL SUCCESS FACTORS IN CONSTRUCTION PROJECTS"* depicts that the construction industry is dynamic in nature due to the increasing uncertainties in technology, budgets, and development processes. Nowadays, building projects are becoming much more complex and difficult. The project team is facing unprecedented changes. He conducted in order to make an attempt to identify which variables influence the success of project implementation. Based on the results of the survey, we anticipate that patterns will emerge regarding the key performance indicators for measuring project success. These results could then be used in effecting successful projects. This study has chosen seventy seven factors categorized in seven groups that the questionnaire respondents were asked to rank and score. SPSS software is used to identify the CSFs which, in descending order of importance, were found to be: Decision making effectiveness, Project Manager's experience, Contractor's cash flow, Contractor experience, Site management, Supervision, Planning effort, Prior project management experience, Client's ability to make Decision.

**2.3 Tey Kim Hai<sup>1</sup>, Aminah Md Yusof<sup>1</sup>, Syuhaida Ismail<sup>2</sup> and Lee Foo Wei<sup>3</sup>** *"A Conceptual Study of Key Barriers in Construction Project Coordination"* Construction projects have often suffered from high fragmentation, large waste, poor productivity, cost and time overruns, and conflicts and disputes for a long time. Thus, many new and innovative management and procurement systems in construction are introduced such as partnering, joint venture, alliances, supply chain management, enterprise resource planning (ERP), just in time (JIT), and total quality management (TQM) to meet these challenges Hence, a study is carried out to investigate the key barriers of coordination in construction project. Through the literature review, five groups of key barriers are established in this paper, including the nature of construction, traditional contractual arrangement, and construction participants, characteristic of organization and construction management approach. The investigation of these key barriers is expected to assist the construction players in

coordinating their projects towards a better implementation of the innovative management and procurement systems.

**2.4. Dubem I. Ikediashi<sup>1</sup>, Akaninyene Mendie<sup>2</sup>, Emmanuel Achuen<sup>3</sup> and Michael G. Oladokun<sup>1</sup>**  
*"Key Performance Indicators of Design and Build Projects in Nigeria"*

It reveals that eight Key Performance Indicators were identified. They are among others, job cost reporting, time performance and quality of work in that order. Also, eight most important Key Performance Indicators were also found to be relevant. They include among others, Health and Safety, Quality of Work and Cost per Unit. Besides, test of agreement conducted using Mann Whitney U test indicate that there was no significant difference in the rankings of time performance, Turnover, Rework/Quality of work among others while there was significant difference in the rankings of cost per/unit, job cost reporting, health and safety among others. It was recommended among others, that fundamental changes be made to reduce the high cost overruns associated with Design-Build projects.

## METHODOLOGY

### 1. Selection of Activities

Selected activities are Excavation, Reinforcement, Formwork, Concreting, Brick masonry, Flooring, Plastering, and Painting which is based on major cost contribution, quantity, aesthetics and safety.

### 2. Selection of Construction Sites

The proposed model and hypotheses were tested by using data collected from well known construction firms.

### 3. Collection of Checklists

The Collection of checklists of the selected Activities from well known construction firms.

### 4. Preparation of Master Checklists

The preparations of Master Checklists were done on the basis of all the important points and collaborating all the checklists collected from the various construction firms.

### 5. Rating of Master Checklists

1 - Not required, 2 - Required but not necessary, 3 - Necessary, 4 - Necessary at most, 5 - Vital activities.

### 6. Distribution of Checklists

Survey was done covering 30 companies from construction sector.

### 7. Analysis of Master Checklists

Analysis part leads to a comparative study within the checks for and activity. It finds a vital, important, necessary, need and not need.

## Observations and Discussions

### 1. Excavation

The following Fig. no. 01(a) & Fig. no. 01(b) of Excavation activity shows the rating from 101-140. Maximum numbers of checks lies in between 131-135 with 10 numbers of checks which are contributing 26% towards quality (These checks are- "Protection of employees from loose rock or soil, Clear view for operators handling machinery, etc"). Similarly, 136-140, 126-130 and 121-125 have the second most number of checks with 8 checks each combining 50% towards quality. Eight checks are the most rated checks ranging from 136-140 as analyzed from the master checklist and should not be neglected (These checks are- "Inspection of site by concerned authority before starting of work, Protection of employees from cave-ins while entry and exit of excavated area, etc").

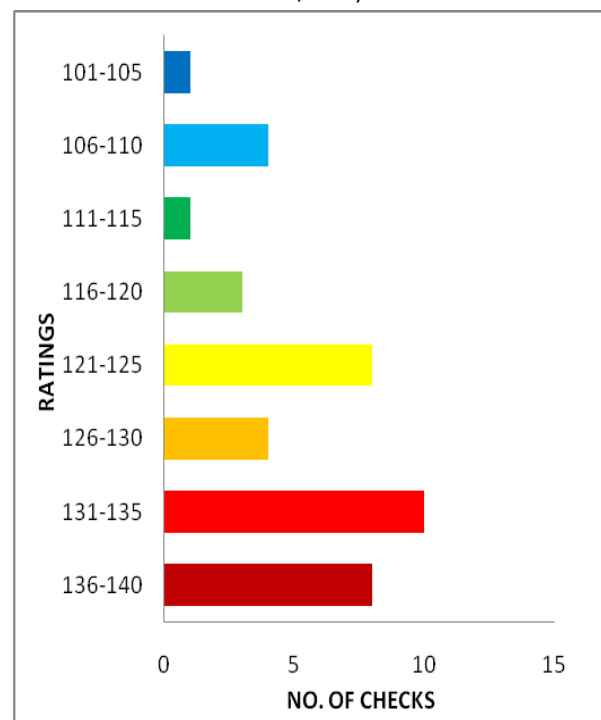


Fig. 01(a)

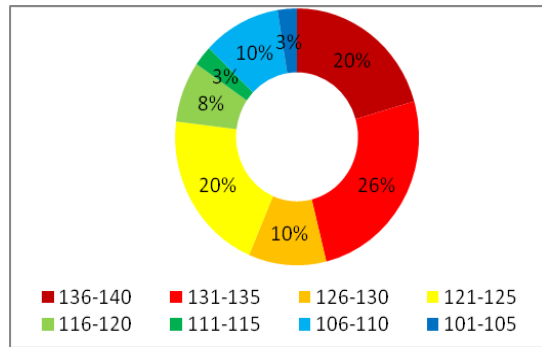


Fig. 01(b)

## 2. Reinforcement

The following Fig. no. 02(a) & Fig. no. 02(b) of Reinforcement activity shows the rating from 121-140. Maximum numbers of checks lies in between 126-130 with 16 numbers of checks which are contributing 43% towards quality (These checks are- "Chairs-sufficient and strong, Stirrups and spacing as per drawing, etc"). Similarly, 131-135 has the second most number of checks with 8 checks contributing 35% towards quality. Five checks are the most rated checks ranging from 136-140 as analyzed from the master checklist and should not be neglected (These checks are- "Has the consultant inspection the reinforcement before the concreting started?, Centre alignment of column reinforcement checked, etc").

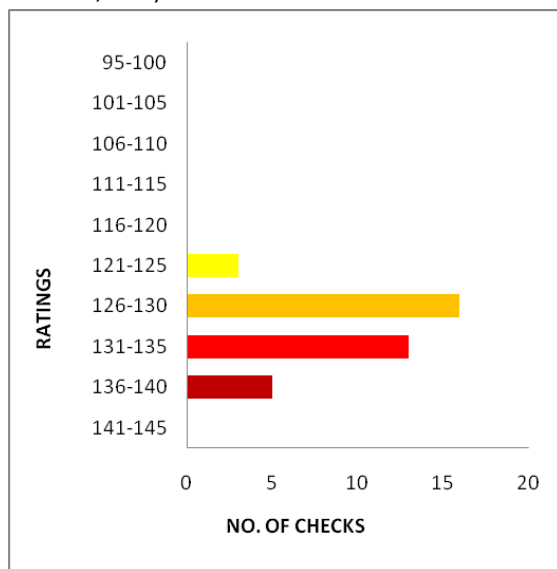


Fig. 02(a)

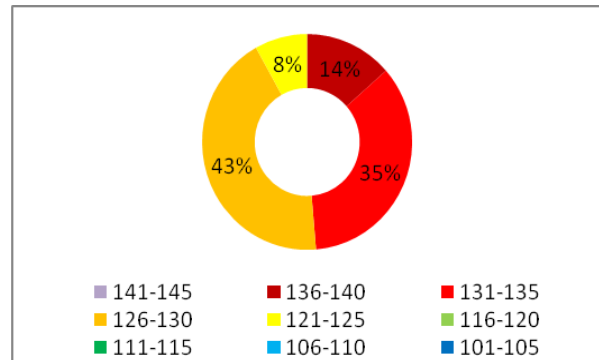


Fig. 02(b)

## 3. Formwork

The following Fig. no. 03(a) & Fig. no. 03(b) of Formwork activity shows the rating from 106-145. Maximum numbers of checks lies in between 131-135 with 18 numbers of checks which are contributing 33% towards quality (These checks are- "Is the de-shuttering time as per specification and done an orderly and safe manner?, Wooden props – the dia. Of the prop is not less than 75mm. the props of required height shall be in single piece, it should not be joined, etc"). Similarly, 136-140, 126-130 and 121-125 have the second most number of checks with 9 checks each combining 51% towards quality. Three checks are the most rated checks ranging from 141-145 as analyzed from the master checklist and should not be neglected (These checks are- "Before the pour has commenced, has the formwork been inspected and signed off / certified by an experienced structural engineer for its structural integrity and compliance to the formwork drawing?, Check for plumb,etc").

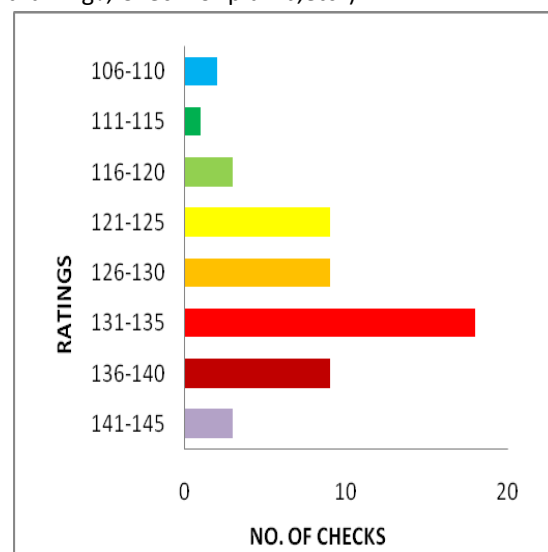


Fig. 03(a)

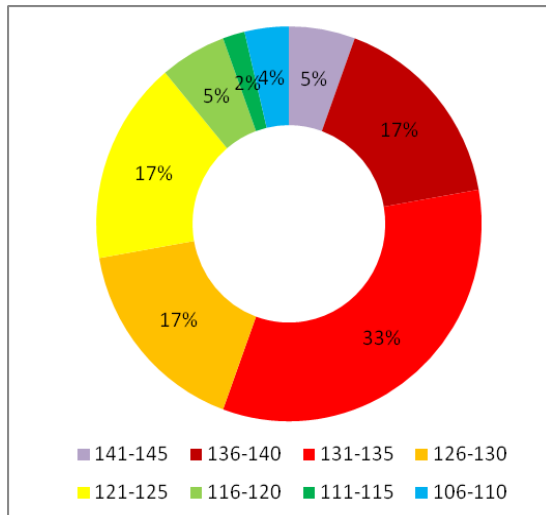


Fig. 03(b)

#### 4. Concreting

The following Fig. no. 04(a) & Fig. no. 04(b) of concreting activity shows the rating from 101-135. Maximum numbers of checks lies in between 111-115 with 15 numbers of checks which are contributing 33% towards quality (These checks are- "Is the cleanliness of the area to be concreted Ok?, Technical supervision of concrete mixing, etc"). Similarly, 116-120 has the second most number of checks with 11 checks each combining 24% towards quality. Two checks are the most rated checks ranging from 131-135 as analyzed from the master checklist and should not be neglected (These checks are- "Are the latest "Good for Construction" drawings available?, Is the concrete produced as per approved as per concrete mix design?").

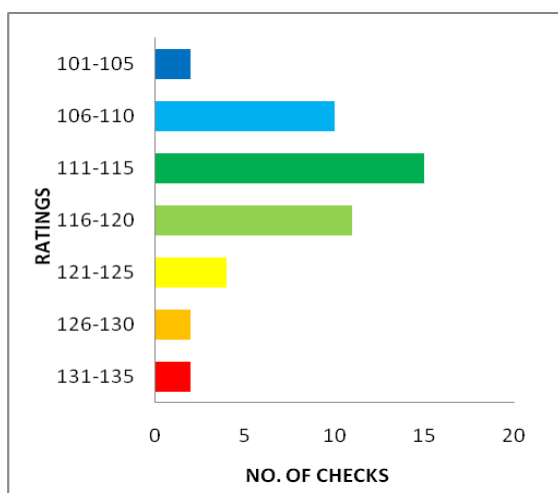


Fig. 04(a)

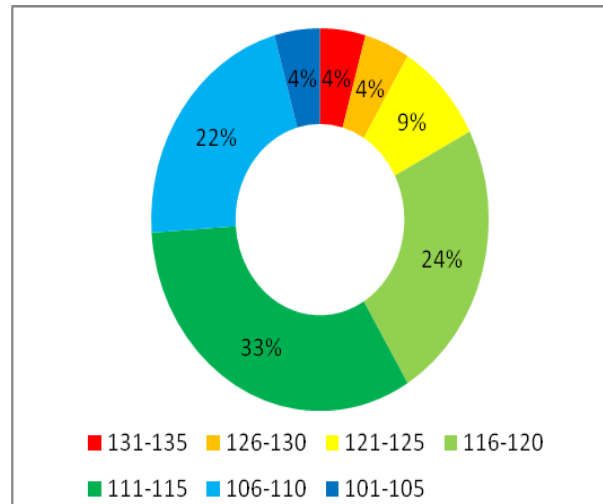


Fig. 04(b)

#### 5. Brick Masonry Work

The following Fig. no. 05(a) & Fig. no. 05(b) of Brick Masonry activity shows the rating from 95-145. Maximum numbers of checks lies in between 116-120 with 10 numbers of checks which are contributing 25% towards quality (These checks are- "Hacking of concrete surfaces of structural members like column, slab, beam, staircase, etc., Check for internal dimensions of room after laying of masonry, etc"). Similarly, 121-125 and 126-130 have the second most number of checks with 11 checks each combining 35% towards quality. One checks is the most rated checks ranging from 141-145 as analyzed from the master checklist and should not be neglected (These checks is - "Cleaning of slab with broom prior for stacking of materials")

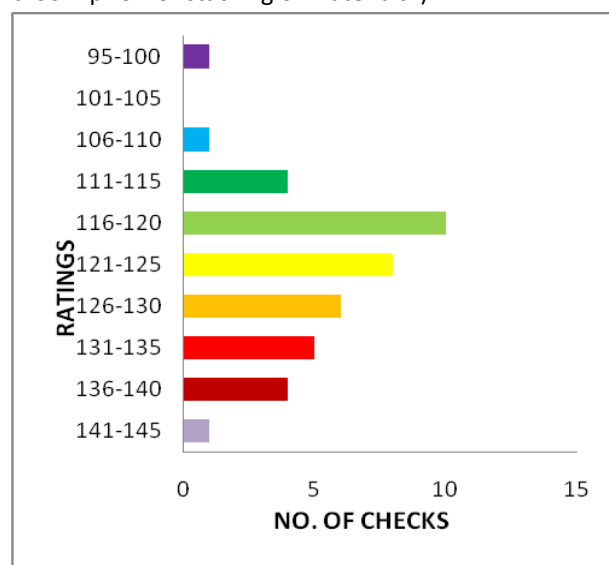


Fig. 05(a)

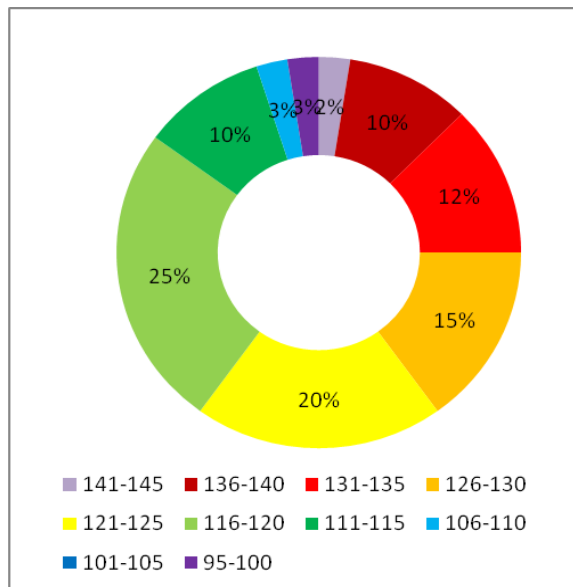


Fig. 05(b)

## 6. Flooring

The following Fig. no. 06(a) & Fig. no. 06(b) of flooring activity shows the rating from 116-140. Maximum numbers of checks lies in between 131-135 with 13 numbers of checks which are contributing 35% towards quality (These checks are- "Has the starting reference point is decided for cut tile adjustment, Check for proper leveling surface and consolidation of bedding, etc"). Similarly, 126-130 have the second most number of checks with 11 checks each combining 30% towards quality. One checks is the most rated checks ranging from 136-140 as analyzed from the master checklist and should not be neglected (These checks is -"Protect tile surface with tarpaulin sheet to avoid damage of surface.").

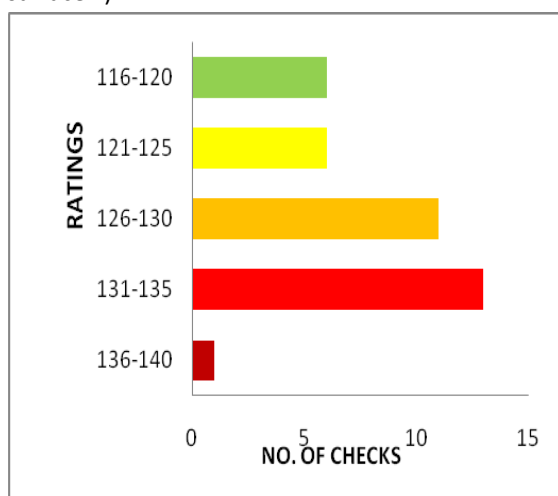


Fig. 06(a)

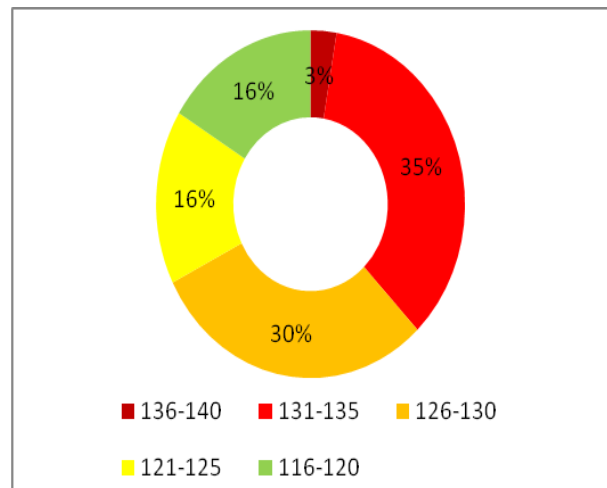


Fig. 06(b)

## 7. Plastering

The following Fig. no. 07(a) & Fig. no. 07(b) of Plastering activity shows the rating from 111-135. Maximum numbers of checks lies in between 126-130 with 20 numbers of checks which are contributing 53% towards quality (These checks are- "Check for racking of masonry joints and hacking on RCC surfaces, Dimensions and diagonals of external sides, etc"). Similarly, 121-125 has the second most number of checks with 12 checks each combining 31% towards quality. Two checks are the most rated checks ranging from 131-135 as analyzed from the master checklist and should not be neglected (These checks are- "Check the thickness and number of coats of plaster. It is specified and implemented?, Location of electrical points, etc").

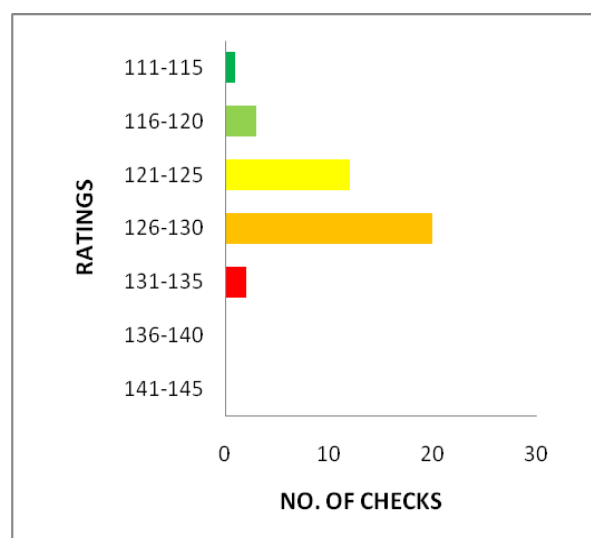


Fig. 07(a)

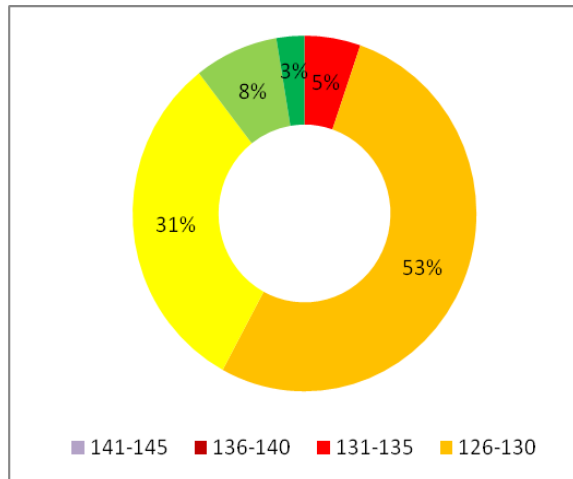


Fig. 07(b)

### 8. Painting

The following Fig. no. 08 of Painting activity shows the rating from 126-150. Maximum numbers of checks lies in between 136-140 with 13 numbers of checks which are contributing 59% towards quality (These checks are- "Approved manufactures specification for painting available, Ensuring complete dryness of ceiling and wall surfaces, etc"). Similarly, 131-135, has the second most number of checks with 5 checks each combining 23% towards quality. Two checks are the most rated checks ranging from 146-150 as analyzed from the master checklist and should not be neglected (These checks are- "Applying coat of rust proof paint, 1st Coat of oil paint, etc").

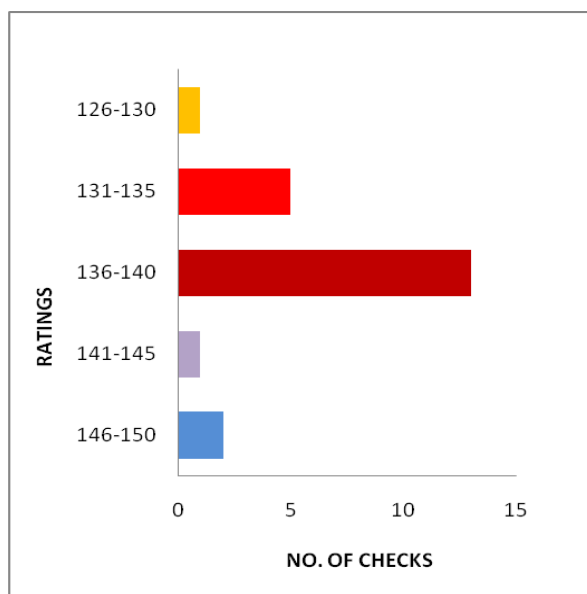


Fig. 08(a)

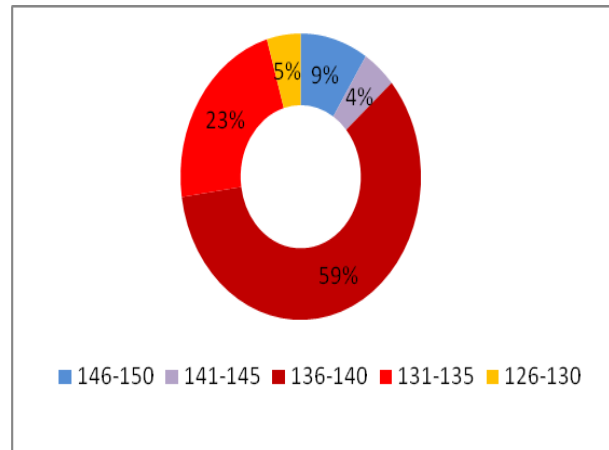


Fig. 08(b)

### CONCLUSION

- 1) Specified activities which are contributing to cost and aesthetic more are segregated and master checklist gives an general view to maintain quality of particular activity.
- 2) Responses collected from professionals' rates checks and give the vitality of an individual check.
- 3) The vital checks require more concentration to improve quality. For e.g. For excavation vital checks are: Inspection of site by concerned authority before starting of work, Protection of employees from cave-ins while entry and exit of excavated area, etc.
- 4) This study gives a percentage contribution for every group of checks come under following heads. (vital, Not required, Required but not necessary, Necessary, Necessary at most).
- 5) From the Analysis, some of the activities like Painting has ratings more than the average rating as the activity is more important from the point of aesthetics.
- 6) For activity like reinforcement the ratings are less than the average ratings, but this activity is more important from the view of stability of the structure.

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