

A STUDY OF QUALITY  
AND WORKING



CONSTRUCTION  
CRETING

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## ABSTRACT

Quality of concrete produced not only assessed from two different construction sites, but can also be distinguished only in one construction site only with a cluster of different mixes. In fact, the quality of concrete is highly dependent on the quality of and quantity of the mixture is used, the quality of work mixing and pouring concrete, quality control and supervision as well as environmental factors. Lately, concrete qualities often disputed. Especially by the customer, especially involving construction projects. All 6 constructions site are selected to done this study. All data will be collected by questionnaire and my own observation at construction site. All data collection will be analysing into IBM SPSS STATISTICS version 20 to show the results. The results shows that the awareness of important of quality concrete still in weakness level. Although all correspondent known very well about the quality of concrete but, they not do it in right way such as storing a materials and culture during concreting. Therefore, JKR or responsible parties need to rise up a level of supervision at construction site to rise up level of quality concrete.

## ABSTRAK

Kualiti konkrit yang dihasilkan bukan sahaja dinilai dari dua tapak yang berbeza, tetapi juga boleh dibezakan hanya di satu tapak bina dengan hanya menilai kelompok daripada bancuhan berbeza. Malah, kualiti konkrit adalah sangat bergantung kepada kualiti dan kuantiti campuran yang digunakan, kualiti kerja semasa campuran konkrit dan mencurah konkrit, kawalan kualiti, penyeliaan dan serta faktor-faktor alam sekitar juga menjadi factor utama. Akhir-akhir ini, kualiti konkrit sering dipertikaikan, terutamanya oleh pelanggan yang melibatkan projek-projek pembinaan. Semua pembinaan 6 lokasi dipilih untuk melakukan kajian. Semua data akan dikumpul oleh borang soal selidik dan pemerhatian saya sendiri di tapak pembinaan. Pengumpulan data semua akan menganalisis ke dalam IBM statistik SPSS versi 20 untuk menunjukkan hasil. Keputusan menunjukkan bahawa kesedaran penting kualiti konkrit masih di tahap lemah. Walaupun semua koresponden yang diketahui dengan baik tentang kualiti konkrit tetapi, mereka tidak melakukannya dalam cara seperti stor bahan-bahan yang tepat dan budaya semasa concreting. Oleh itu, JKR atau pihak-pihak yang bertanggungjawab perlu bangkit tahap pengawasan di tapak bina untuk bangkit tahap kualiti konkrit.

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**LIST OF ABBREVIATIONS**

JKR	Jabatan Kerja Raya
UMP	University Malaysia Pahang
SPSS	Statistical Package for Social Sciences

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 BACKGROUND OF STUDY**

Historical existence of the concrete work is said to begin in Greek and rom where at first they used a mixture of lime dust. After that, it was upgradeable to the use of water, lime, sand and broken rock. Original mortar used to bind concrete structures and till this day still exists building using this technique the Coliseum in Rome and the nearby Port Du Gard Times.

Despite the existence of the structure is still there, but the quality concrete work at the time was not recorded for use in nowadays and it's just a historical legacy. However, all efforts are made by research experts and provide answers to all the questions and problems faced.

Concrete structures can be designed for up to 100 years and the material can remain up to 100 years of use. However, concrete can also fail suddenly after several years of use. (A.F Baker, 1992)

Concrete is a building material that is commonly used on construction sites in the civil engineering industry. Concrete produced with different characteristics, thus producing different concrete quality.

Quality of concrete produced not only assessed from two different construction sites, but can also be distinguished only in one construction site only with a cluster of

different mixes. In fact, the quality of concrete is highly dependent on the quality of and quantity of the mixture is used, the quality of work mixing and pouring concrete, quality control and supervision as well as environmental factors.

Jabatan Kerja Raya (JKR) has run investigation up some concrete structures throughout Malaysia. From the investigation, results showed nearly 70% of the failed structure not because of structure.

Deterioration of concrete and corrosion of steel reinforcement is a major factor structural failure occurs. Among the factors that caused the failure is caused by the use of inappropriate materials, poor quality of work, lack of supervision and oversight, specifications and codes of practice that do not suitable and lack of understanding about the process of deterioration of the concrete due to the attack of environmental factors.

However, the failure of the structure is also not to be taken lightly. This incident proved to Penang second bridge collapse in 2013. From the research, Department of Safety and Healthy Penang (DOSH) has found collapse is a major factor underlying the cause of structural failure collapse of the concrete ramp at the exit of the Second Penang Bridge.

Besides that, working culture also will be an important part to produce good quality of concrete. Working culture include all the part doing during concreting, before concreting and also after concreting of concrete. Working culture was important element; this is because, from the working culture, it will affect the result of concrete.

Surveys are one of working culture in construction field. Concrete surveys including inspection and testing. A concrete survey, concrete sampling and concrete testing are required to establish the condition of a concrete structure.

## 1.2 PROBLEM STATEMENT

Lately, concrete qualities often disputed. Especially by the customer, especially involving construction projects in Kuantan and Pekan, Pahang. Expressed their dissatisfaction with the quality of work carried out, especially during the pre-hand over and hand over of the completed building. The ability of the quality of work the JKR began disputes by customers, especially on the quality of concrete used.

Working culture also always disputed during concreting. So a research need to be done to find out the real working culture at site construction, and to find out that they whether follow the guidelines or not.

To support this research, some articles have been found out to emphasize the quality of concrete and working culture during concreting. June 8, 2013, Saturday, GEORGETOWN, early investigation from DOSH, factor of failure based structure is because of failure of working structure and weakness of concrete. And they said," this happen maybe low of surveillance and maintenance during installation.

JKR also have done investigation on several concrete structures, and they found that about 70% failure of concrete not a structure failure.

Based on this article and also other report and complaining, that proves that the quality of concrete and working culture at site construction cannot be underestimating and consider it as a minor issues. Therefore, studies and research should be done to find the cause of the problem and restore the confidence of the various parties to the JKR.

### **1.3 OBJECTIVE**

The main purpose of this research is to improve the quality of concrete and working culture during concreting. To achieve the goal, the following objectives of the study are structured as follow:

The main objective of this research is to study the factors that lead to low quality of concrete in Kuantan and Pekan especially.

To study, concrete practice during construction work at site and to know the level of surveillance during the concreting and working culture.

To analysis the data collection and reserves to produce the better quality of concrete and working culture will be presented.

### **1.4 SCOPE OF STUDY**

Scope of the study will involve research on concrete works and the level of surveillance by the related parties during the production of concrete in building construction projects. All activities of concreting will be considering.

Assessment will be made on the quality of concrete produced starting from a pre-concrete until the opening of the box mold concrete at a construction site. Besides that, examine the cause's concrete quality deterioration. Furthermore, working culture also will be considered including material and storage, concrete mix, testing and also compressive strength.

To achieve the entire goal, six (6) construction sites will be selected around Kuantan and Pekan. All active construction will be selected. Correspondent will involve in this research is JKR staff, contractor, site engineer, project manager, and also all parties that link with this field of work.

## **1.5 RESEARCH SIGNIFICANT**

The study and research is expected to help improve the quality of the concrete results of the highest quality in the future. Besides that, it is hoped will serve to direct those involved in the field of concrete works. Working culture during concreting also expected to improve for the highest result in the future.



## **CHAPTER 2**

### **LITERITURE REVIEW**

#### **2.1 INTRODUCTION**

Concrete results from a mixture of cement, water, coarse aggregate and fine aggregate. It is mixed at the rate of a particular mixture and left to harden and form a structure. To produce quality concrete techniques has be understood and in done well and carefully. Quality of the concrete depends on the quality of the raw materials used, the mixture, water quality, how to mix, and other processes until the curing process and the removal of the mold box.

Working culture is important to produce the high quality of concrete. Working culture is how they work and is the follow the guidelines of working culture to produce the concrete, such as, the material storage, surveillance of concrete, activities during concrete work and also the work after concrete.

In addition, the supervision and control of the charge is also important in ensuring the quality of the resulting concrete other than the quality of the materials and methods mentioned above. The management should not leave fully to the workers.

It is mean; the process of producing quality concrete can be divided into three (3) main stages (Mahyuddin Ramli, 992):

- Pre-concrete stage

- Concrete stage

- After concrete stage

Figure show the process of produce concrete:

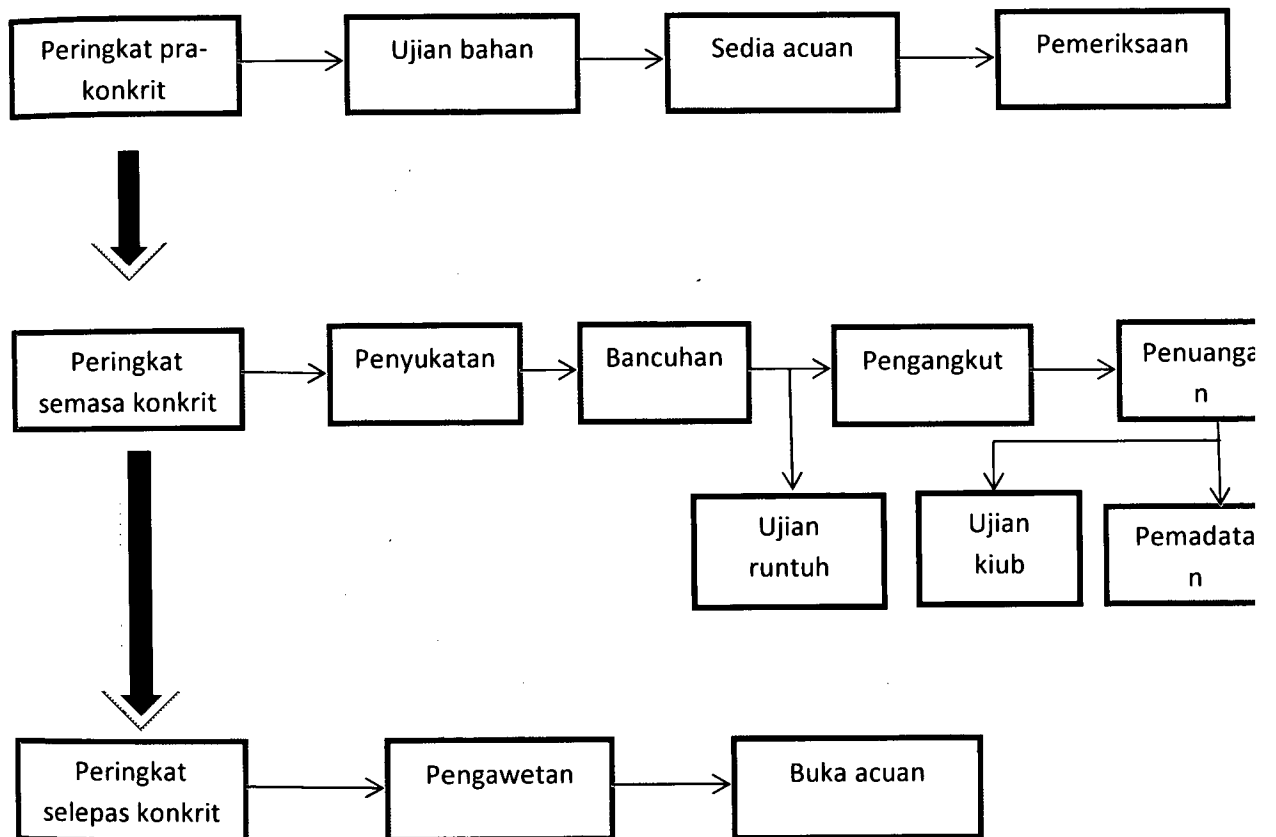


Figure 2.1 Aliran Proses Kerja Konkrit

## 2.2 DEFINATION OF QUALITY

Quality means excellence. It is thus a philosophy rather than a mere attribute. The difference between two objects is judged by their qualities. We set some standards which determine the level of acceptability. In most industries especially in manufacturing and process industry, the concept of quality management is old and used extensively. Nowadays, application of quality management is not only becoming popular but also mandatory in construction industry. In an information technology product or service, quality is sometimes defined as "meeting the requirements of the customer.

Mike Sondalini, Managing Director Lifetime Reliability Solutions HQ state that quality is, people have found many ways to define what quality is. Some of the most popular definitions for quality are listed below. All of them are right, as they each contain a key element of what quality means to users of products and services.

- a. A degree of excellence
- b. Conformance to requirements
- c. Totality of characteristics which act to satisfy a need
- d. Fitness for use
- e. Fitness for purpose
- f. Freedom from defects
- g. Delighting customers

One of the leading advocates for quality was Philip Crosby. In the 1970s he proclaimed that "quality is free" because doing something right the first time at a high level of quality was cheaper than fixing it later. Crosby defined quality as "conformance to requirements."

So, overall from the statement about quality, quality can be conclude as;

- i. Something excellent and can acceptable and meeting the requirement of costumer
- ii. Quality is something can improve to be more better because it is including too many aspect that considered
- iii. Quality is something free and it is satisfied everyone.

### **2.3 DEFINATION OF CONCRETE**

Concrete is a composite material composed of coarse granular material (the aggregate or filler) embedded in a hard matrix of material (the cement or binder) that fills the space among the aggregate particles and glues them together. Famous concrete structures include the Hoover Dam, the Panama Canal and the Roman Pantheon. The earliest large-scale users of concrete technology were the ancient Romans and concrete was widely used in the Roman Empire—the Coliseum was built largely of concrete and the concrete dome of the Pantheon is the world's largest. After the Roman Empire collapsed, use of concrete became scarce until the technology was re-pioneered in the mid-18th century. Today, concrete is the most widely used man-made material (measured by tonnage) in the world.

From “Wikipedia” it can be defined Concrete is a composite material composed mainly of water, aggregate, and cement. Often, additives and reinforcements are included in the mixture to achieve the desired physical properties of the finished material. When these ingredients are mixed together, they form a fluid mass that is easily molded into shape. Over time, the cement forms a hard matrix which binds the rest of the ingredients together into a durable stone-like material with many uses.

## **2.4 DEFINITION OF WORKING CULTURED**

Culture is the environment in which you work all of the time. Culture is a powerful element that shapes your work enjoyment, your work relationships, and your work processes. But, culture is something that you cannot actually see, except through its physical manifestations in your work place.

Working culture sometimes called organizational culture affects everything from how much your employees like their jobs to how likely they are to timely complete tasks. All of the subjective elements of how you run your business are a part of office culture, and choosing people whose skills and personalities complement your workplace.

## **2.5 PRE-CONCRETE STAGE**

In the pre-concrete, three main activities should be prioritized is, storage of materials, materials testing, and inspection of the reinforcement and the mold box. In this process, careful preparation is needed to avoid delays and disruptions in concrete works.

### **2.5.1 Storage of Materials**

The materials used for concrete works should be collected and stored in one place. The purpose is to prevent the storage of materials damaged by mixing with other materials. In addition, the material stored potential to pass during the test material. There are three (3) main materials to be stored.

### **2.5.1.1 Storage of Cement**

Cement supplied in two (2) conditions, in bulk or in bags. Bulk cement will be delivered by trucks weighing 15 tons and blown into a storage silo by compressed air. Cement bags are supplied with filling into bags weighing up to 50 kg (A. Neville, 2002).

Storing cement important to ensure this cement dry and prevent the occurrence of the phenomenon of air set. Phenomenon of air will set up a lump of cement hydrated and it cannot be used because it will cause the concrete to be weak.

Cement bags must be stored on a raised floor and weather-tight place, is to prevent deterioration of quality. Cement must be used in turn to avoid it received as a result of hardening of cement deposition. In addition, the cement can be stacked more than 1.5m high. Even if kept in good condition, the cement will lose up to 20% strength after 2 months (G.F Blackedge, 1975).

Officer may direct the superintendent of any bags of cement that has hardened or deformed it appears in whatever form caused by age, damage to the bags, storage imperfect and others, and are removed from the construction site immediately (JKR Standard Specification for the work-building, 1998).

### **2.5.1.2 Storage of Aggregate**

Aggregates should be stored so as to be uniform in terms of grading and moisture content as well as control of the mix with the other ingredients. For a good store, 100mm thick concrete floor shall be form (Blackedge, 1975). In addition, the restriction should be made to isolate aggregates of different sizes and to prevent overflow from one compartment to another compartment. Restrictions may be using concrete, brick, or block retaining walls (Blackedge GF, 1975).

All aggregates are in general to comply with Malaysian Standard, MS 74. All aggregates shall be of the type that are strong, durable, clean and not webbed and does not contain ingredients pest enough to adversely affect the strength and durability of concrete and reinforcement. Aggregates shall be stored separately (JKR Standard Specification for building works 1998)

### **2.5.1.3 Storage of Reinforcement**

Reinforcement bars should be arranged on the ground level, to prevent mud or dirt. Bar also be isolated and labeled according to the type of bar that is easily recognizable. Before concreting, reinforcement should be free of dirt, oil, grease, paint, rust flakes and anything that can interfere with concrete or steel chemically or reduce the bond between the materials (Blackedge, 1975)

### **2.5.2 Test Material**

Tests on the material are made to ensure strength and durability of the material and also to ensure they comply with the conditions required by the standard. There are three (3) core laboratory tests (Mahyuddin Ramli, 1992), namely:

1. Quality Control
2. Compliance Criteria
3. Additional test

### **2.5.2.1 Testing of Cement**

Tests revealed the construction of cement is rarely required. Usually the test will be performed in the laboratory by skilled workers and will produce results.

Therefore, a standard test used to compare the random nature of the type of cement to another or to maintain consistency in production for the market.

Typically, the required tests on the cement is, fineness test, setting time test, strength test, soundness test, heat of hydration test, and chemical composition test.

### **2.5.2.2 Testing of Aggregate**

Good quality aggregates for concrete work should be checked to meet the desired criteria such as texture rugs design details, aggregate strength and bonding, physical properties such as specific gravity, density, loose, porosity and moisture absorption, resistance to acid and alkali as well as grain size and grading (Mat Lazim Zakaria, 1987)

To test the above properties, laboratory work and skilled labor required. However, for small or medium-scale projects, just to test the limits of grading only.

Aggregates must be tested according to the standard 2 to 6 Malaysia MS 75. Event of failed samples, the authorized officer the right to use its discretion whether to reject samples are obtained, direct that it be washed or filtered, or allowing it to be used with the amendments to rate concrete mix specified (JKR Standard Specification for building works 1998)