IMPLEMENTATIO] NG SYSTEM (IBS) IN MA]STRY

NOORUL AMIMAH BINTI ISMAIL

Report submitted in partial fulfilment of the requirements

for the award of the degree of

B. Eng (Hons) Civil Engineering

Faculty of Civil Engineering and Earth Resources

UNIVERSITI MALAYSIA PAHANG

JUNE 2014

ABSTRACT

Since 1998, Malaysia Construction Industry Development Board (CIDB) has been actively promoting the implementation of Industrialised Building System (IBS) in our country. The most popular IBS component implemented in Malaysia construction projects is precast components (IBS Type 1). Over the years, the total number of precast manufacturing has increased from 15 in 2009 to 36 factories in the year 2011.This research project is to study the implementation of IBS in government and private residential project, to identify the most types of IBS implemented in residential project and to identify the obstacles in implementing IBS in the construction project. The data were collected by the prepared and distributed questionnaire also interview. It were being analysed using Microsoft Excel. Even though IBS was known as a systematic and mechanised method of construction compared to the conventional method in Malaysia Construction Industry but still there are still some obstacles faced by construction industry practitioners. Hence, some recommendation was identified and provided to improve IBS implementation in Malaysia.

ABSTRAK

Sejak tahun 1998, Lembaga Pembangunan Industri Pembinaan Malaysia (CIDB) telah mempromosikan pelaksanaan Sistem Binaan Berindustri (IBS) di negara kita. Komponen IBS yang paling popular dilaksanakan dalam projek-projek pembinaan di Malaysia adalah komponen pratuang (Jenis IBS 1). Berdasarkan projek penyelidikan untuk beberapa tahun ini, jumlah pembuatan pratuang telah meningkat daripada 15 kilang pada tahun 2009 kepada 36 kilang pada tahun 2011. Tujuan projek penyelidikan ini adalah untuk mengkaji tahap pelaksanaan IBS dalam projek kediaman samada sector kerajaan mahupun swasta, untuk mengenal pasti jenis IBS yang paling dilaksanakan dalam projek kediaman dan untuk mengenal pasti halangan-halangan yang mungkin timbul semasa pelaksanaan IBS dalam projek pembinaan. Data-data dikumpulkan melalui soal selidik yang disediakan dan diedarkan juga melalui temu bual. Ia telah dianalisis menggunakan Microsoft Excel. Walaupun IBS dikenali sebagai kaedah yang sistematik dan melibatkan pelbagai jentera pembinaan berbanding dengan kaedah konvensional dalam industri pembinaan Malaysia tetapi masih terdapat beberapa halangan yang timbul dan dihadapi oleh pihak yang terlibat dalam industri pembinaan. Oleh itu, beberapa cadangan telah dikenal pasti dan disediakan untuk meningkatkan disamping untuk memperkembangkan pelaksanaan IBS di Malaysia.

TABLE OF CONTENTS

CHAPTER 2 LITERATURE REVIEW

CHAPTER 4 RESULT AND DISCUSSIOM

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

IBS	Industrialised Building System
CIDB	Construction Industry Development Board
SOP	Standard Operation Procedure

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

A delay of time and high use of money during construction may cause a delay of the project period and make it be uneconomical. Thus, the ultimate goal of using the Industrialized Building System (IBS) is to make it be more productive in timely and economically.

Industrialized Building System (IBS) is a progression of the new development construction technology for the time being. It is an alternative of development that can change numerous aspects in building construction. The industrialized building framework that is constructed utilizing pre-assembled components and is efficiently done utilizing machine, formworks and different manifestations of mechanical supplies. The components are fabricated offsite and once finished will be conveyed to construction sites for assembly and erection (Rahman & Omar, 2006).

It is likewise could be interpreted as a system which component is manufactured in factory and then installed on site based on the size and dimension of the component required. Moreover, a system in which concrete components prefabricated at site or in factory are assembly to form the structure with least in situ construction.

Industrialized building system is not new in Malaysia. It had started in unanticipated 1960s when Ministry of Housing and Local Government of Malaysia went by numerous European nations and assess their housing development program. In 1964, after they went to a visited then the government had started two (2) projects

which are pilot project to increase the delivery time and Light Rail Transit (LRT) station.

A year later, the government started an alternate project that is a six (6) block of 17-story flats and three (3) blocks of 18-storey flats at Jalan Riffle Range. This project was honoured to Hochief Chee Seng utilizing French Estoit System (Din, 1984).

Presently, the Industrialized Building System (IBS) in Malaysia has slowly broadly utilized as a present day system of construction. As an example, the Industrialized Building System (IBS) has been applied in several projects such as Kuala Lumpur International Airport (KLIA), government quarters in Putrajaya, Light Rail Transit (LRT) and Bukit Jalil Sport Complex. Besides, Industrialized Building System (IBS) centre which is located at Jalan Chan Sow Lin, Cheras, Kuala Lumpur was established to help on the association of the system. The implementation of Industrialized Building System (IBS) in this nation will help to decrease the passage of foreign labor and to facilitate the advancement of the construction.

It is essential to actualize Industrialized Building System (IBS) in Malaysia because if high request from clients to the construction activities. This draws in a high number of foreign labor to be utilized to do the hand jobs. In reducing the foreign labor and cost of the construction project, Industrialized Building System (IBS) should be implemented.

Besides, the economical forces can be one of the reasons why the Industrialized Building System (IBS) is so important to our country. This factor may affect the organizational of the clients and also the construction progress. The broader view of the Industrialized Building System (IBS) is about a changing the conventional mind-set, championing human capital development, developing better coorperation and trust, and promoting transparency and integrity (Shaari and Ismail, 2003).

In term of cost and time certainly, attaining better construction quality and productivity, reducing risk, IBS offer benefits to adopters. Based on occupational safety and health, reducing risk is by alleviating issue on skilled worker and depency on

manual foreign labor also achieving ultimate goal of reducing overall cost of construction.

1.2 PROBLEM STATEMENT

Nowadays the construction industry has been changed due to the current technology. The IBS method can be as one of the best methods to increase the quality and safety in the construction industry.

As IBS being introduced by Malaysia CIDB, there are five (5) types of Industrialised Building System (IBS) for the most part utilized within construction. There are Type 1: Pre-Cast Concrete Framing, Panel and Box Systems, Type 2: Steel Formwork System, Type 3: Steel Framing Systems, Type 4: Prefabricated Timber Framing System, and Type 5: Block Work System. Over the years, the total number of precast manufacturing has increased from 15 in 2009 to 36 factories in the year 2011. IBS Type 1 is the most type that highly implemented in order to increase the quality and safety of the building also to reduce the unskilled labor. Besides, the cost and time consuming to complete the construction project can be decreased and increase the level of accuracy of the design. Hence, if IBS is implementing to the government and private residential project so which is the most type of IBS implemented.

Besides, IBS is well known with can perform a better productivity in timely and economically compared to the conventional method. However, there is maybe some obstacle may arise while implementing IBS in any construction project. So, the investigated obstacles will improve the IBS implementation.

1.3 RESEARCH OBJECTIVES

There are three (3) research objectives based on this study:

i. To study the implementation of IBS in government and private residential project.

ii. To identify the most types of IBS implemented in residential projects.

iii. To identify the obstacles in implementing IBS in the construction project.

1.4 SCOPE OF STUDY

The study will be done based on the scope limit to ensure the objectives of the study can be achieved. This study was focused on three (3) parts. They were included the area of study, the method of study and the respondent involved. This study was conducted in Kelantan, Pahang, Penang, Kuala Lumpur and Johor. These two methods which are questionnaires and interviews were done as the method of this study. The first method is a questionnaire survey was designed and prepared based on the objectives of the study. These methods were used to gather the information for the IBS implementation in the government and private residential project. The questionnaires were sent to fifty (50) respondents from government and private sector. Besides, the second method is interview, which involved ten (10) respondents respectively. The targeted respondents involved in this study are the project manager, project engineer and site engineer.

1.5 SIGNIFICANCE OF STUDY

This study was done to study and gather more information about Industrialized Building System (IBS) together to study the implementation of IBS in government and private residential project. The implementation of IBS as a construction method was determined by five (5) types of IBS as stated by CIDB. They are Type 1: Precast Concrete Framing, Panel and Box System, Type 2: Steel Formwork System, Type 3: Steel Framing System, Type 4: Prefabricated Timber Framing System and Type 5: Block Work System. According to each type, there are several elements included. So,

the study was identified which is the most type of IBS implemented in the residential project. Moreover, the study was determined the obstacles arise while implementing IBS to the project. The findings of this study can be used as guidance on the implementation of IBS also some recommendation and action were provided so that the obstacles concurrence can be minimized.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Basic theories of Industrialized Building System (IBS) will be covered in this chapter include its definitions and some more details. In improving the understanding global view about IBS in general, all this information is essential.

One of the constructions, technological advancement is Industrialized Building System (IBS). It is assembled on site which produced the construction material. The current scenario and problems can be changed by using this system in the local construction on local industry. Before the prefabricated components delivered to site, it was fabricated at the factory.

In ensuring the component has no defect and delivered on time, the components may involve some process. The beginning process is needed to reduce waste either in material or cost. Planning, managing and maintaining quality is the beginning process of Industrialized Building System (IBS).

Industrialized Building System (IBS) brings a good expectation to the construction industry. It can reduce unskilled and foreign labor. Besides, it can provide a safe environment on site and ensure the structural works are in good quality. It is also will shorten the time period of the construction process and saving cost.

2.1.1 Definition of Industrialised Building System

There are various definitions of IBS from previous studies. It is also conceptually defined based on their perception in many terms. IBS is a process by which the components of building are conceived, planned and fabricated at the factory, transported, and erected on site described by Junid (1986) as among the earliest researchers. The system needs both software and hardware in its system design studies which is about its requirement to the end user, market analysis, and developing the components that was standardized. IBS is a system which uses industrialized production in components production's or the building assembly or both was defined by Parid (1997).

According to Chung (2007) he defining IBS are a mass building production's component that construct using a standard shape, size, and dimension which assembled either in the factory or at site. Then the components will be rearranged at the site of the construction. It referred to building construction standard requirement once it was delivered to the site.

Rahman & Omar (2006) stated that IBS is a construction system that is built using pre-fabricated components. Machine, formwork and other forms of mechanical equipment are used to organize the manufactured components. Firstly the components are manufactured in a factory and after that will be delivered to the construction site. Then the components will be an assembly and erection.

IBS is building systems used prefabricated components where the components are manufactured in a factory, on or off site. With less of the additional site work, the material and components was transported, positioned and assembled on site. This is described by the Construction Industry Development Board (CIDB).

IBS roadmap (2003) defined IBS is a system that involved prefabrication works for the products, components, utilities techniques or in its building system itself. Prefabrication works are off-site of on-site works under controlled environment. It was transported, positioned and was installed on site by minimizing the site works.

2.1.3 Types of IBS

On structural aspects of the system, IBS can be classified into five common types. In Malaysia, based on Construction Industry Development Board (CIDB, 2003) it has classified the IBS system into 5 categories. They are Type 1: Precast Concrete Framing, Panel and Box System, Type 2: Steel Formwork System, Type 3: Steel Framing System, Type 4: Prefabricated Timber Framing System and Type 5: Block Work System.

2.1.3.1 Type 1: Precast Concrete Framing, Panel and Box System.

Type 1: Precast Concrete Framing, Panel and Box System are one of the most favourite types that have been chosen for IBS implementation in the construction industry. The components that include in this category are precast concrete column, beams, slabs, walls, permanent concrete formwork, and "3-D'' components.

This type was divided into two main elements which are framed structures and load bearing walls. Typical elements of frame structure are beam, column, slab and non-load bearing walls. Usually, these components are manufactured off-site using machines and moulds. The second elements of type are load bearing wall system. It is offering a more convenient system of slabs and walls. Load bearing walls are the most common element implemented is load bearing walls cast in situ and precast load bearing walls. Both elements can be manufactured in a factory or made on site. Type 1 is highly implemented because it is more flexible and sustainable structures (Mahyuddin Ramli, 2006).

Figure 2.1: Type 1: Precast Concrete Framing and Wall System

2.1.3.2 Type 2: Steel Formwork System

This system is popular implemented to the roof frame. Structural steel is suitable for high-rise buildings and is usually used for wall panels and precast concrete slabs in the production of hybrid structures with a fast time (Yazid, 2011).

Based on the manufacturing processes and materials, structural components in steel frames are divided into two types which are hot and cold rolled steel. It was offered a faster site installation and reduction of labor when compared with other types of IBS. The components that include in this category are forms of the tunnel, tillt-up systems, the molding form of beams and columns, and formwork using permanent steel.

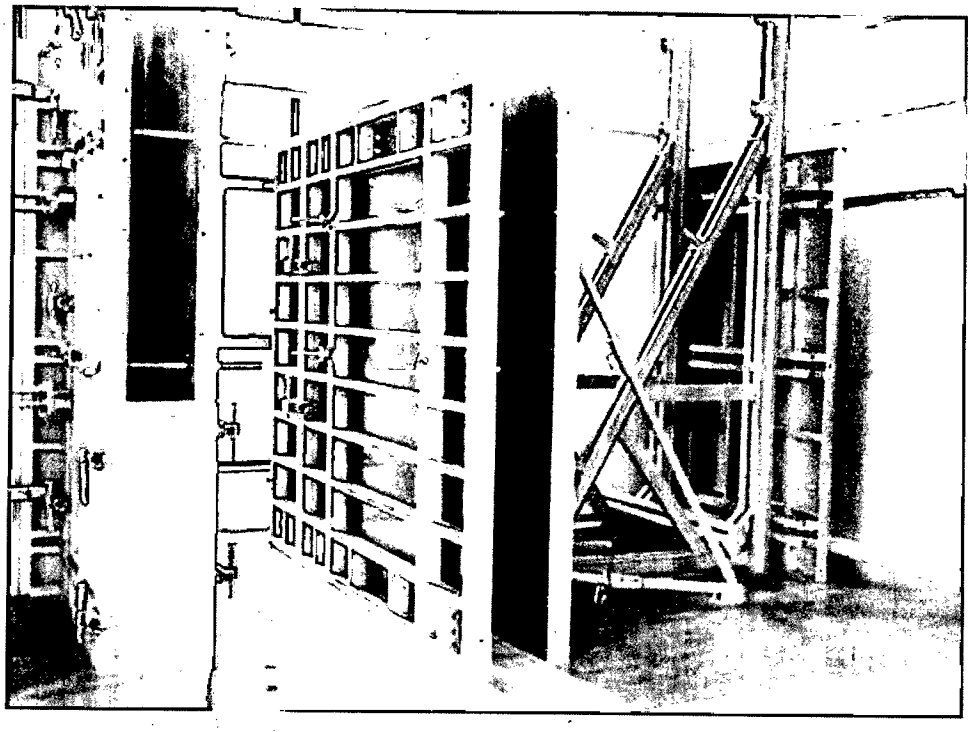

Figure 2.2: Type 2: Steel Formwork System

2.1.3.3 Type 3: Steel Framing System

The components that include in this category are steel beams and columns, roof trusses, and portal frame system. These systems perform construction process uses a systematic way and mechanical based. Using a panel of reusable moulds, in-situ concrete production can be increased.

It was also can increases the speed of construction through the fast concrete work process. In terms of cost, it was reduced by standardizing the size of the structure and ensure mobility and concreting cycle. In the other hand, the walls and slab components can be produced simultaneously through the use of system formwork. Most of the system is based on a steel mould but lately aluminium and plastic-based system was used.

Figure 2.3: Type 3: Steel Framing System

2.1.3.4 Type 4: Prefabricated Timber Framing System

The components that include in IBS Type 4: Prefabricated Timber Framing System is timber frames and roof trusses. Prefabricated timber frame systems are among the most under-utilized IBS elements implemented for the local system to construct the roof frame. Regarding to Razak (2009) the use of prefabricated timber for other components of the structure is almost non-existent in Malaysia except for endowment and some special chalet. Besides, the least uses of timber can decrease the quantity of waste produced at a construction site.

However, because the traditional Malay houses are also prefabricated timber based in terms of structure and function through the use of joinery without nails and reliability of its transpose. So it is being expected that the provision of the prefabricated local nail will also produce other products roof in the future.

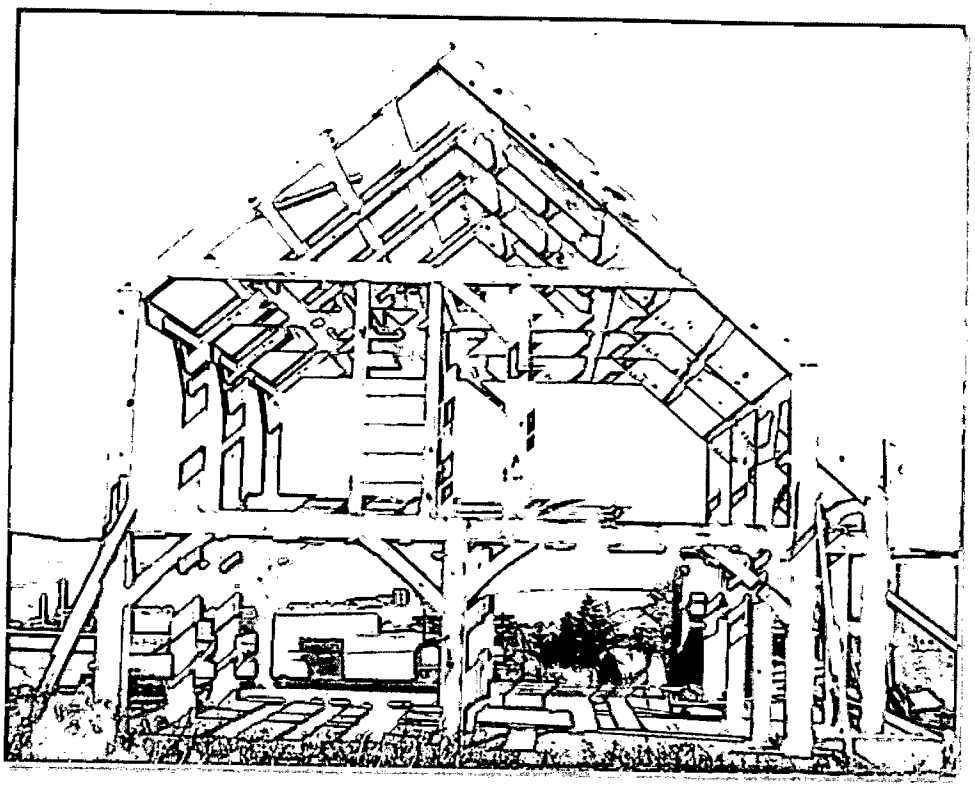

Figure 2.4: Type 4: Prefabricated Timber Framing System

2.1.3.5 Type 5: Block Work System

The components that include in this category are lightweight concrete blocks and Interlocking concrete masonry (CMU). Basically, it is a kind of technology based on IBS precast concrete. Due to its small size if compared relative to other components of IBS, it may be managed easily and have a high degree of tolerance. Most of the block can be made easily on site and have a low production cost.