COST EFFECTIVENESS COMPARISON OF PRE-FABRICATION WITH CONVENTIONAL CONSTRUCTION METHOD FOR RMAF GROUND DEFENSE BUNKER

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ABSTRAK

Kaedah pembinaan pre-fabrikasi bukannya perkara baru dalam industri pembinaan Malaysia, namun penggunaannya masih pada tahap yang rendah. Pihak kerajaan sewajarnya menggalakkan penggunaan pembinaan pre-fabrikasi terutamanya pada projek-projek pembangunan kerajaan termasuk projek pembangunan keselamatan negara. Kaedah pre-fabrikasi merupakan kaedah moden yang diimplimentasikan secara luas di negara-negara membangun dan ia telah dibuktikan berkesan menjimatkan kos pembinaan, tenaga kerja, tempoh pembinaan, dan kualiti pembinaan.

Pangkalan Udara Kuantan telah dipilih untuk kajian kes disebabkan ia merupakan Pangkalan TUDM yang pertama dilengkapi dengan kubu pertahanan pangkalan. Data-data yang diperlukan telah diperolehi daripada tiga fasa kajian kes ini, meliputi tinjauan tapak, temubual, dan perbandingan kos pembinaan antara kaedah pre-fabrikasi dengan kaedah pembinaan tradisional. Penemuan-penemuan daripada data yang dianalisis membuktikan kubu-kubu sedia ada tidak memenuhi speksifikasi dan menimbulkan masalah-masalah kepada TUDM dan JKR sewaktu perlaksanaan projek. Walau bagaimanapun, kaedah pre-fabrikasi akan menyumbang kepada penyelesaian masalah-masalah yang timbul dan terbukti dari segi keberkesanan kos jika digunakan. Kajian ini telah mencadangkan pengagihan kerja dan tanggungjawab menyeluruh perlu diterapkan kepada semua pihak yang terlibat dalam projek pembangunan kubu. Kajian juga mengesyorkan ketelusan maklumat kos pembinaan amat penting diperolehi daripada pihak JKR.

Tujuan utama dan objektif-objektif yang ditetapkan dalam kajian ini telah tercapai di mana masalah kerosakan yang terjadi kepada kubu-kubu yang sedia ada serta masalah-masalah pengoperasian pangkalan harian telah dikenalpasti. Persoalanan berkenaan perbandingan kos pembinaan kaedah pre-fabrikasi telah dibuktikan dan didaati kos pre-fabrikasi lebih berkesan, Maklumbalas daripada kebanyakan respondan menunjukkan penggunaan kaedah pre-fabrikasi yang menyeluruh di semua Pangkalan/ Unit TUDM pada Rancangan Malaysia Ke-10 adalah memungkinkan dan boleh menjimatkan kewangan pertahanan TUDM.

ABSTRACT

Pre-fabrication construction method is not new in Malaysian construction industry yet the utilization of such method still relatively low. Government should conduct thorough study of pre-fabrication method aspects and implement it widely especially for government based projects including national security development projects as well. Pre-fabrication method is a modern construction method that widely use by developed countries and it proven that to be more cost effective and cost saving on the aspect of cost, labor, time, quality and durability.

Pilot project of bunker construction in Kuantan Airbase (KAB) has chosen as case study for this research. While data required for this case study was generated from site survey, interview segment and construction cost comparison of pre-fabrication with conventional bunker construction. The findings showed that none of defense bunkers were fully complied with specifications. Majority of respondents agreed that current construction method caused several problems to RMAF and PWD. Pre-fabrication method was foresees contributed solutions to overcome current problems and furthermore this study identified that pre-fabrication is cost effectiveness for implementation. Recommendations suggested to improve current construction caused problems on site by imposing clear delegations and responsibilities for stakeholders whereas encourage cost information transparency provided by PWD.

The primary aim and objectives of this study has been accomplished successfully in which the findings have eliminated uncertainties and arguments on pre-fabrication method cost effectiveness. Majority of respondents gave a feedback that pre-fabricated bunkers implementation are possibility for mass implementation of pre-fabricated bunkers in 10^{th} Malaysian Plan in all RMAF Bases. This action will save financial of RMAF defense.

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LIST OF ABBREVIATIONS

Brig Gen	Brigadier General
Capt	Capten
CCD	Camouflage, Concealment and Decoy
CDD	Chief Deputy Director (PWD)
CIDB	Construction Industry Development Board
CMU	Concrete Masonry Units
C/ NC	Compliance/ Non- Compliance
Col	Colonel
DP&D	Department of Planning and Development
EXO	Executive Officer
IBS	Industrialize Building System
ID	Identification
KAB	Kuantan Air Base
Maj	Major
MC	Modular Coordination
MMC	Modern Method Construction
NBCR	Nuclear, Biological, Chemical, and Radiology
OPP	Outline Perspective Plan
PWD	Public Work Department
QA	Quality Assurance
QC	Quality Check

QS	Quantity Surveyor
RMAF	Royal Malaysian Air Force
Sect A	Sector Alpha
Sect B	Sector Bravo
SO 1	Staff Officer 1
SO 2	Staff Officer 2
SOP	Standard Operating Procedure

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Ground defense is part of defense plan for every Royal Malaysian Air Force (RMAF) bases. In conjunction with the enhancement of RMAF base ground base defense program, a series of study, planning, design and review has been conducted by RMAF Department of Planning and Development (DP&P) and its' selected project team. A complete RMAF ground defense program proposal had been delivered to the highest-level management of RMAF for their consent and approval. Among all the elements in the proposal, one of the important supporting elements is ground defense bunker.

A great numbers of standardized bunkers will be built throughout all the RMAF bases in Malaysia for the next Tenth Malaysian Plan. However, before the mass implementation of bunkers construction in all the RMAF bases, Kuantan AirBase (KAB) has been selected as the very first base to be equipped with these

bunkers. These bunkers are in the budget of Ninth Malaysian Plan. These pilot bunkers are purposely for design review and feasibility study of the future new designed bunker.

After two consecutive years of the construction of nine (09) bunkers in KAB, project design team assigned faced the same repetitive problems such as unstable yearly costing of bunker construction and no construction standardization in size and other specifications due to the lack of engineering knowledge and incompetency of Class-F contractors selected by Department of Public Work (PWD).

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Furthermore, lack of influential power in contract awarding process and payment process by RMAF personnel has made it even more difficult to select capable contractor and reduce unnecessary cost incurred during construction. While contractor usually tries to gain as much profit as they can and tend to use sub-standard or low quality materials throughout the construction process. RMAF design team in fact generalize this problem after found out that all the contractors were using bricks to assemble the bunker's ventilation part, instead of using reinforcement concrete as what stated in method of construction.

Additional, by selecting any random contractor to work inside the base potentially offer a treat to base in term of information leakage, sabotage, and espionage, during period of On-site construction activities. Therefore, more work forces from military have to assign to project site to monitor movement of contractors.

1.2 Research Background

Issues of construction cost and specification standardization has raised the main concerns of the design team to find a better execution plan to mitigate the existing problems of bunkers development plan. Moreover, potential safety and security issue also have to take into consideration while implementing the plan.

Design team has to propose the alternative solutions and usage of pre-fabrication construction method could be one of the alternatives beside conventional construction method. Comparisons in term of cost effectiveness and specification standardization are needed in order to justify which alternatives are more reliable.

Prefabrication construction has the advantage of rapid erection and a fast onsite construction, and the elements are produced in factories, which secures good quality. But requires a detailed design and connection details are complicated. In the respect of generation of construction waste, a research conducted (Tam et. Al, 2004) had proved that prefabrication construction tends to produce less wastage than conventional construction.

In the RMAF, conventional construction method is the only implementation for the development of all type construction projects, even though issues of inadequate contractors, slow productivity, traditional and costly construction method is still repeating. However, determination to resolve and improve the current problematic situation, RMAF will be adapting contemporary construction method such as pre-fabrication system for the beneficial of RMAF organization.

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