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**EFFECTS OF VARIATION IN THE INFRASTRUCTURE PROJECTS:
PERSPECTIVE FROM MAIN CONTRACTOR**

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ABSTRACT

Variation is trendy and commonly inevitable in all construction projects, primarily in the Malaysian construction industry, including infrastructure projects. It may bring positive, negative, or both effects to the parties involved in the construction project, especially the contractor. This research aims to determine the most significant effects of variation works to the infrastructure projects and ascertain some strategies for the contractor to overcome the in dealing with variation works. This research's objectives are to identify the factors of the variation works in the infrastructure projects, determine the effects of variation works on the infrastructure projects, and ascertain the main contractor's strategies in dealing with the effects of variation works in infrastructure works. To achieve the study's objectives, a survey was conducted by distributing questionnaire survey form to 123 respondents who are Quantity Surveyors, Architects, Civil Engineers, Mechanical & Electrical Engineers, and contractors. All respondents are from G7 Contractor Civil Engineer Companies registered under CIDB and govern the Kelantan areas. The results have been analysed using Google Form, Microsoft Excel 2013, and SPSS 26. The research findings found that the most factors contributing to variation is ineffective communication between parties. Communication is essential in everything, including the construction industry, such as infrastructure projects. Second findings also conclude that the main contractor's effect during variation is unconscious of secondary impacts such as loss of productivity on the works not included in variation order, delay, and disruption events. The last findings revealed that the strategies to overcome the challenges ascertained by the contractor are day-to-day process recording, which is the most chosen strategy for dealing with variation. By the end of this research, the results are expected to show the factors, effects of variation to infrastructure projects, and the main contractor's strategies in dealing with the effects of variation work in infrastructure works. For recommendation, industry professionals have to develop infrastructure projects' preventive measures. If the management takes precocious steps and educates the main contractor with the discussion, the variation rate's harmful effects eventually decrease, and visible improvement could be monitored.

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1.4 Methodology

1.4.1 Introduction

A precise strategy is being prepared to finish the study within the time limit stated to meet the purpose of this research. Every action is scheduled and recorded as it happens to ensure that no component of the process is missed. The research for a dissertation is a crucial element of the process. Research is the key to conducting systematic information investigations to solve an issue or contribute to understanding a theory or practice (McMillan & Wengin, 1994). According to Powel (1995), no one commonly recognized definition of research "because there is more than one form of study." However, Goldhor (1972) defines research as "...any deliberately prepared inquiry or any examination that tries to expand one's understanding of a specific situation."

Meanwhile, research procedures are the dissertation process that uses the scientific method to provide dependable and believable outcomes. Every research technique starts with a research question. A well-defined research problem is essential to perform well-defined research. The next level in the research process is the research design stage. As a result, the research approach adopted determines the design. The next stage of the procedure is data collecting and analysis. Data collection and interpretation are determined by the study approach utilized. The last stage of the research process involves reporting the findings and making recommendations for future studies.

The research might be quantitative or qualitative. Quantity is typically used as the foundation for quantitative, and qualitative analysis was concerned with quality. The qualitative and quantitative research frameworks for investigating the social environment and management have been presented as fundamentally different.

1.4.2 Research Methodology Outline

The quantitative research strategy is being applied in the execution of this study. Quantitative research is a formal, objective, systematic approach for learning about the world via numerical data. According to Cormack (1991), quantitative research may be roughly categorized into three types: descriptive, quasi-experimental, and experimental.

This investigation is carried out methodically with the objective and goal of the study in mind; four phases were carried out in this research. The first term recognized the problem and developed objectives, scope of work, problem description, and research question.

The researcher then employed the stratified sampling strategy for data gathering in this investigation. The questionnaire has been delivered to all infrastructure contractors, and