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Faculty of Engineering
Structural Department

Construction Economies of Modern Construction Systems Technologies (Tilt-up System)

A thesis submitted in partial fulfillment of the requirement of the Master of Science in Civil Engineering

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STATEMENT

This thesis is submitted as partial fulfillment of M.Sc. Degree in Structural Engineering, Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or qualification at any other scientific entity.

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ABSTRACT

In terms of the importance of economics of construction systems and the significance of construction time in terms of project feasibility, this study was initiated with the objective of elaborating construction methods and tilt up technique. The study focuses on the technique, its development from solid building (without architecture shapes) to irregular curves in panel in order to consider horizontally extended building or six stories building**.** A ***case study*** was designed. It is a project for residential villas of order port officers in Rub' El kale in kingdom of Saudi Arabia. Data were assembled and a cash flow was executed implanting three systems of construction for horizontal extension (i.e. cast in situ, pre-cast and tilt-up system)**.** A ***questionnaire*** was designed to survey the opinion of experienced respondents. It was distributed among participants (i.e. different organizations, different companies' sizes, consulting offices and private companies. The questionnaire was to survey their experience and opinion. The responds were ***assembled and analysed***. The economy of prefabricated systems factors were divided into four groups (i.e. administrative, financial, technical and general factors)**.** A ***quantitative statistical analysis*** was executed to the output of the questionnaire via statistical tables to rank the severity of factors. A ***comparison*** was held among the mean values within the groups. This was achieved for overall sub factors (i.e. ranking of administrative, financial, technical, general, main Groups and top ten critical factors)**.** A comparison was held among three systems by implementing Primavera software (to generate timeline), and cash flow. The analysis was achieved considering the engineering economy, Net Present Value (NPV), Internal Rate of Return, payback period for bank loans to cover the cash flow negative period and break even analysis**.** A ***reasonable perspective*** was obtained that would help in the comparison process between tilt-up and other systems. The study ***highlighted recommendations*** and recommendations for future research**.**

Keywords: Tilt-Up, Pre-cast, Pre-fabricated Systems, Construction Management, Engineering Economy.

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