

Projects for Good

The Assessment of Construction Plant and Equipment Management

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Summary

This research project has reviewed past research and has investigated the significant tools for the selection criteria of construction plant and equipment. Based on qualitative and quantitative findings this research will establish the criteria for the selection of sustainable construction plant and equipment for onsite mechanization. The sustainability criteria results showed that there are differences between the conventional way of procurement which mostly emphasises cost, the time and the quality.

Due to global warming it is imperative for the plant and equipment industry to incorporate sustainability into every aspect of the construction process. This will assist mostly civil construction contractors in the selection and development of better and more sustainable plant and equipment machinery to meet the triple bottom line of sustainability; profit, planet and people.

It should also be noted that it is the intent to have an in-depth case study to verify the identification factor for the sustainability criteria selection. This, the researcher hopes will lead the industry professionals to arrive at a rational decision in promoting the sustainability of the construction plant and equipment paradigm for the global warming consideration.

Context

Plant and equipment maintenance is a science as is the art of using technical knowhow to identify problems for different treatment and processes. Plant and equipment standardised classification is divided into eight categories,

which are based on application, technology and attachments.

Aims

The aim of this research is to discuss in detail the products of Construction Plant and Equipment Management (CPeM) research over the last decade. The objective of this research proposal will include:

- The identification of published research
- Observe the behaviour of the research
- Compare and contrast published works
- To base on the future direction of CPeM

The Project

This research methodology uses a triangulated research strategy, the strategy utilises a literature review to evaluate the current on-line research. The research includes literature concerning construction plant and equipment, optimisation, productivity, maintenance/equipment down-time, automation and sustainable environments. This method was completed with the aid of a survey to analyse the finding of the literature review.

A potential challenge could be to satisfy several constraints imposed by a project and the contractual agreements; these constraint factors could include:

- Condition of the project site
- Project specifics and timeframes
- Location of the project site

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- Mobility of plant and equipment to and from the project site
- Bulkiness/suitability of the required plant and equipment required for the project
- Poorly managed CPeM and construction delays

The project survey was carried out to reflect the real opinion of professionals in the construction industry relating to the assessment and selection criteria for plant and equipment for various construction projects. The process of the questionnaire ensures that a critical path is followed in the development of the key theories while forty surveys were sent to various construction professionals including project managers, construction managers, engineers, quantity surveyors and plant and equipment managers. All the categories' outlined were selected from the built environment construction professionals' surveys, from which their opinion can be analysed and applied to other research techniques.

This research methodology was carried out using both qualitative and quantitative research methods. The qualitative aspect of this research was to develop a basis to establish background knowledge about the selection of the onsite construction plant and equipment. In addition, this research shows the relevant published data from periodicals, journals, conference proceedings, and web-based knowledge were analysed for this research report. The quantitative aspect of this research helped to develop a framework intended for the main survey and questionnaire. This was shared with selected construction professionals to identify any gaps and shortcomings before launching the full-scale questionnaire and survey. They all reported relevant factors for this selection of onsite construction plant and

equipment.

A variety of indicators are combined with sustainability criteria section, these criteria are classified into three different groups of sustainable development; the socio-economic criteria, the engineering criteria, and the environmental criteria. For the purpose of this research objective and to achieve the useful results from the questionnaire survey, a closed-ended questionnaire was created to gain views from the construction industry participants. The second phase of the data collection was based on the Likert scale question which asked respondents to rate the importance of the criteria selection techniques on a five-point scale. 20 responses were received giving an overall participation rate of 21.5%.

Personal Impact

This experience has broadened my horizons and skills both professionally and academically. I have significantly improved my research skills and improved my ability to study academically. I was able to gain knowledgeable specialist exposure in the subject of construction management and has encouraged me to enhance my academic knowledge further.

This research was an interesting topic for me as it impacts my work life experience immensely and has provided me with a broader view of strategies applied to procuring construction plant and equipment and the sustainability criterion which I hope to experience and learn from in the coming years.

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Results

A total number of 40 construction professionals were contacted in the pilot study questionnaire survey and 20 responses were received, a return rate of 50%. The survey results provided an overall satisfactory picture of the survey questions. The feedback analysis shows that the respondents are mostly from the private sector and have satisfactory work experience (35% have work experience within the range of 10 – 20 years, 15% have over 20 years' experience and 30% had 1 – 5 years' experience). The result also showed that 30% of the respondents had a Bachelor's degree, 40% had a Master's degree, 5% had a Ph.D. and 20% had diploma. The demographic data showed the involvement of the construction firm with different infrastructure projects which includes residential construction at 50%, high rise building (office or residential) at 15%, while bridges and roads and highways are both at 5%.

The success was observed through the triangulated method to identify the selection criteria for the construction plant and equipment. However, at this point the researcher concludes that the hypothesis has been successfully tested while the project objectives can now be satisfied.

The following factors were established at the end of this research, namely:

- The performance factors
- The system capability
- The life cycle cost
- The operational ease
- The environmental impact
- The social benefits

Results

The project aims have been achieved through implementing a research methodology enabling the successful initial assessment of plant equipment and management selection criteria.