Setting the New Trends for BIM in Construction: Productivity, Performance, Competitiveness, and Innovation

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Abstract: Productivity has been a wide-ranging challenge for the construction industry, both in Australia and globally. Particularly in Western Australia's construction and resources sectors, continuously low productivity will potentially discourage future investments. The emergence of the global marketplace necessitates that the supply chain needs to focus on the concept of the holistic efficiency. The isolated geographical position of Australia only exacerbates this phenomenon. In recent years, Building Information Modelling (BIM) has been suggested as an efficient way to help productivity improve and information management throughout supply chains. This keynote talk will focus on discussing ways of implementing BIM to enhance site productivity focusing on Western Australia's construction projects. It will show new trends of its applications to accomplish an innovative way in construction project management. The talk will also give an insightful summary of integrated methods with state-of-the-art technologies backboned by the BIM cases from construction and oil and gas industry projects.

Keywords: Building Information Modelling BIM; Oil and Gas Industries; Productivity; Innovation in Construction; Western Australia

I. INTRODUCTION

According to research conducted by the 'McKinsey Global Institute' in 2012 [1], improving labour and capital productivity could increase Australia's annual income by $90 billion AUD per year by 2017. This highlights the urgency for industry to address the efficiency issue, and it is a priority area that could lead to reaping large rewards in future income growth [2]. According to discussions with many industries in Perth, Western Australia (such as Woodside Energy Ltd, KAEFER Integrated Services, and BGC Corporate), three key points were able to be defined for this research demand: (1) Geographical Location; (2) High Unit Price of Resources; and (3) High Labourer Cost. The emergence of the current global marketplace necessitates that the supply chain focus on distribution efficiency [3]. The isolated geographical condition of the Australian continent thus exacerbates this phenomenon.

Many construction sites in Australia, in fact, suffer from defective deliveries from international suppliers, and this has been clearly observed many times during previous field studies (e.g. unfit window frames and un-sized scaffolds) [4]. Furthermore, it causes the cost of material resources and shipment prices to rise, resulting in unexpected inefficiencies during projects. When it is narrowed down to the project level, Australia requires many construction projects for the mining/oil/gas industries [5] [6]. Also, most resource reserves are located in remote areas, which aggravate this occurrence. [7]. The relatively high labour cost in Australia, compared to neighbouring countries, is considered as another critical factor that brings considerable challenges to the research in improving efficiency throughout the supply chains of Australian industries.

This paper briefs one Australian construction case and its new trend for BIM: Scaffolding Operation. It finally aims to accomplish the innovative way to improve construction productivity, and competitiveness.

II. NEW TRENDS FOR BIM: SCAFFOLDING OPERATION

The scaffolding operation as a temporary structure requires a wide range of information that must be dynamically integrated during its process. Properly pre-defined scaffolds will be available to distribute the critical information by Radio Frequency Identification (RFID) tags, and an integrated BIM model will provide the optimal visualization as a communication tool [8]. The labourer's productivity can therefore be enhanced by the provision of this superior information. There are four applications in this implementation: 1) Scaffolding Design based on Point Cloud Data; 2) Scaffolding Design for Sequential Activities; 3) Scaffold Erection Process Simulation and 4) Ergonomics Simulation. The keynote talk will specify these applications, but also cover many other relevant projects to show the new trends of BIM in Australian construction projects.

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III. SUMMARY AND DISCUSSIONS

The ever increasing complexity of construction projects requires improved methods for communication and data acquisition supported by state-of-the-art sensors and technologies [9] [10]. From the operational level, a well-planned communication channel would be the key to minimizing wastes throughout supply chains. In this context, the keynote will describe a new trend of Building Information Modelling (BIM) supported by IT-based Technologies. Ongoing research has found that the implementation of BIM combined with technologies benefits many actual projects in Australia by increasing the efficiency of the whole supply chains.

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