# 3D PRINTING MODELLING IN MALAYSIAN CONSTRUCTION INDUSTRY

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**ABSTRACT** Three-dimensional (3D) printing has long been used in the manufacturing sector as a way to automate, accelerate production and reducing waste materials. By using this technology, it is possible to build a wide variety of objects provided that (i) the necessary specifications are provided to the printer and (ii) no material limitation problems. With 3D printing becoming cheaper, more reliable and, as a result, more prevalent to the world at large, it may soon make inroads into the construction industry. However, little is known about 3D printing usage in the construction industry and its potential for the future. Thus, this paper seeks to investigate this situation by providing a review of the relevant literature. The method chosen for this research was the descriptive survey approach through conducting interviews with targeted interviewees in order to collect their opinions regarding onto development and application of 3D printing in Malaysia. The findings shows that there are some potentials usage of 3D printing in the future, although its application is low in current stage due to high cost and strong contractors preference in traditional methods.

**Keywords:** Three Dimensional Printing, Construction, Contractors, Technology.

## 1. INTRODUCTION

Historically, there has been a general opinion and perception about the construction industry as conservative construction companies are often referred to as late adopters of new technologies. This is because there is a conflict between the nature of the companies and project behaviour. Generally, the companies are characterized as regressive organizations that fully masters projects with short time-frames and limited available space, while a construction project is a complex process and is occasionally referred to as a process with low productivity and high degree of non-value adding activities as a result of challenges in managing construction process. Thus the construction industry is normally blamed for its inefficiency.

One of the technologies that had been given significant attention is 3D printing which also referred as 3DP. 3DP is not only the fastest; it is also the least expensive amongst comparable alternatives [1]. One of the main advantages the construction industry has over the others is that it is already experienced in computer aided manufacturing. The Government's intention to require collaborative 3D BIM (Building Information Modelling) on all its projects by 2016 may also promote the use of 3D printing [2].

Hence, this paper focuses on exploring the potential use of 3D printing in local construction industry, which further leads to determine the benefits of this technology to improve the construction work performance.

## 2. RESEARCH METHODOLOGY

Due to the nature of this technology and the limitation of its usage in the construction industry currently, qualitative research strategy was used to collect subjective data (personal opinions) from the key users or stakeholders in the construction markets. Due to limitation of time and nature of this subject, the professional opinions from two representatives from two local consultant companies were analysed, compared and justified based on the scope of questions set.

## 3. FINDINGS AND DISCUSSION

There were six key questions which were asked and answered by the interviewees during the companies visits. The main findings are highlighted in Table 1, and discussed in details as follows:

**Table 1.**Opinions onto the application of 3D Printing Modeling in Malaysian construction industry

| Question(s) | Respondent (1) | Respondent (2) |
|---|---|---|
| Potential of 3D Printing Modeling in Construction | • Able to design complicated objects<br>• Waste Reduction | • Able to print movable parts<br>• Strength<br>• Wide range of superior finishing details |
| Limited application in Malaysian Market | • High cost for large scale printing<br>• Degradable over time and Sensible at outdoor exposure | • Low quality which further affect object's design, functionality and resistance |
| Strength of using 3D Printing Modeling | • Good visual perspective | • Show incredible details |
| 3D Printing Modeling's Performance in Measurement | Not available | • Particularly useful for high repetition<br>• Elimination of errors and improved accuracy<br>• Reduce measurement time |
| Risk of Apply 3D Printing Modeling | • Accuracy of works | • Long hours to produce.<br>• Limited material |
| Future Forecast of 3D Printing Modeling in Malaysia Construction Industry | Not available | • Ability to print components for actual use. |

Basically, the most significant benefit for 3D printing usage in construction industry is to provide better visual effects for all the stakeholders to justify their final design and construction decisions. Besides, the usage of this technology can be further explored in building finishings and BIM integration. However, the limitation of material choices to be used in 3D printing which further affects the appearance and durability of the products printed, and high production costs for large scale objects are the key problems faced by this technology currently.

## 4. CONCLUSION

İn short, based on the feedbacks from the related 3D printing consultants, it is found that 3D printing modelling has certain potentials and opportunities to be applied in Malaysian construction industry in the future as it become a new trend in construction industry in terms of providing better modelling qualities. Unfortunately, there is still lack of awareness onto its application in local market due to high cost of designing it in large scale and limitation of material used. Actions should be taken to integrate the 3D printing with BIM approach in order to enhance the quality of construction outputs.

## REFERENCES

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