

# 3D Printers for Sustainable Construction

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## Situation

- An increase in building construction due to an increase in population and growing demands.
- The limited availability in energy and resources that can be utilized in building construction.

**Research Question:** How can 3D printing contribute to the sustainability of building construction?



## Problems

Building construction has two main problems associated with it:

- Waste produced by the building process
- Labour force cost
- Amount of pollution emitted during and after construction[4].
- Time

Table 1: Quantity and Percentage of Non-Hazardous Wastes , 2014 (Tonnes) [1]

Source of Wastes	النسبة المئوية %	المجموع Total	Method of Disposing					
			Method of Disposing		Methods of Recovery			
			Other methods in Disposing	Dumping ?	Other methods in recovery?	Composting	Recycling	
Constructions Waste	55.9	#####	27,440.0	#####	15,154.4	0.0	2,153,330.6	
Municipality Waste	20.6	5,228,527.8	0.0	#####	606,260.0	560.0	395,656.3	
Industrial General Wastes (Non-hazardous)	15.4	3,899,601.1	124,000.0	#####	6,914.0	0.0	475,368.6	
Agriculture Wastes	3.0	766,081.9	16,054.0	663,610.0	2,760.0	83,657.9	0.0	
Sludge of Wastewater <sup>4</sup>	3.0	766,248.1	0.0	672,085.3	68,370.3	25,792.5	0.0	
Others	2.1	538,868.3	0.0	538,868.3	0.0	0.0	0.0	
Total <sup>5</sup>		#####	167,494.0	#####	699,458.6	110,010.4	#####	
% of disposing Method	100.0		100.0	0.7	84.2	2.8	0.4	11.9



## Solution

More efficient ways are needed for construction, therefore 3D printing of sustainable buildings could be used.

Software applications such as, AutoCAD can be used to model a 3D construction and interface it with the printer.

A 3D printer can be used on site, and it can be assembled on-site or transported to the site.

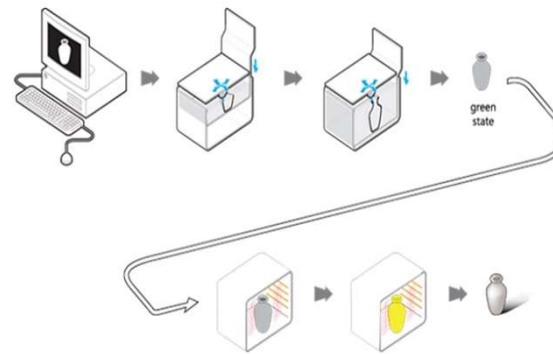


Figure 1: 3D ceramic printing process [2].

Additionally, 3D printers use the exact amount of material needed for a construction which reduces waste emissions [5].

3D construction printers contribute to lower costs in terms of:

- Labour force
- Transportation
- Material



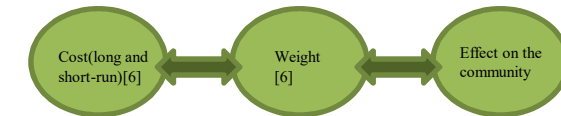
Figure 2: Schematic of a 3D printer and the printed construction [3].

Sustainable buildings use efficient materials in constructions.



## Evaluation

We evaluated our solution in terms of three factors:



## References

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