

Construction waste is costly: What's causing it on South African building sites?

October 6 2022, by Anne Fitchett



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The construction industry contributes significantly to a country's economy through infrastructure development. The industry has [expanded](#) rapidly worldwide and further [growth](#) is expected.

This has contributed to a great deal more [construction waste being generated](#)—which has been identified as one of the [core problems](#) in the [construction industry](#) across the world. The literature suggests that as much as [30%](#) of the material delivered to a [construction site](#) ends up as [waste](#).

The increase in waste has been driven by the fact that [construction](#) projects are now much more complex. This has made it harder for construction managers to manage waste effectively.

Also, building waste is [difficult to recycle and reuse](#). A lot is contaminated—for example when wet concrete or mortar is dumped on other [waste materials](#).

In South Africa between [5 million and 8 million tons](#) of [construction waste](#) are generated annually. Only a small fraction is reused or recycled. The result is that a large amount of waste is [disposed of in landfills](#), which are rapidly reaching capacity in many places.

One way to approach the problem is through the principle of "lean engineering"—a strong focus on minimizing waste. To find out whether these principles were being used on [construction sites](#) in South Africa, we did [research](#) in Gauteng province. The province is the economic hub of the country and region and has the greatest number of [construction projects](#).

We found these principles were not being used widely. But all the construction managers in our study were aware of them and their potential value. This suggests there is scope for improvement in waste management.

Our key finding was that training site workers could make a big difference to waste control and prevention. This is aligned with lean

thinking in that it aims to empower people to play a part.

What happens on building sites

For our study, we interviewed ten construction managers sampled randomly from the [Construction Industry Development Board](#) list of registered contractors. We limited the selection to medium-sized companies.

Eight themes emerged from the interviews: types of material waste; causes of physical waste; methods to minimize waste; benefits; cost and time implications; application of lean construction; waste management plan; and most effective method to minimize waste.

We found that [procurement during construction](#) played a role in the waste generated. Sometimes wrong items were ordered, or there was over-stocking caused by not being able to purchase small quantities, or the wrong materials were delivered.

Frequent variation orders, waiting for replacements, materials that were not in compliance and inaccurate estimation methods also contributed to [construction waste](#).

Concrete and other cementitious materials were most frequently cited, followed by bricks. Plastic and cement bags, formwork and sand were also mentioned.

Participants explained that concrete waste happened when it was poured to an incorrect level, requiring demolition and rework. Ordering more ready-mix concrete also caused waste.

Brick waste on the building sites happened when bricklayers broke the brick in half and did not use the remaining half.

The two most prevalent reasons that were cited for the causes of waste were lack of skill of laborers and subcontractors, and poor supervision. Other reasons included poor material handling, negligence, speed of execution, design changes, poor management and planning, and the normal work process.

Construction workers sometimes did incorrect work, leaving waste after the incorrect work was demolished.

Pinpointing solutions

The respondents identified a range of methods for reducing waste. The most prevalent was reuse and recycling, particularly concrete, mortar and bricks, which can be used for [rubble fill](#). Many of the sites promoted sorting and recycling by hiring skips from specialist companies.

Other methods included proper material handling, reducing offcuts and proper quantification. Respondents mentioned management methods like weekly ["toolbox" meetings](#), issuing of non-conformance notices and raising awareness of the cost implications of waste.

Respondents mostly concurred on the benefits of waste reduction. Cost saving and improved profitability were mentioned six times. Six of the respondents highlighted reduction in pollution and a cleaner site.

All ten agreed that construction waste had a negative effect on project duration and profitability because [waste took up space on the construction site](#). Removing it resulted in delays. Additional costs were incurred through extra supervision, cleaning, skip hire and transportation, as well as penalties for delayed completion.

Only two of the sites were contractually required to have a waste management plan, which included the use of skips, prevention of soil

contamination, disposal at a registered dumping site and the recruitment of a specialist waste removal subcontractor. Some respondents reported that they used [waste management](#) plans created by the construction company. Others did not see the need for a plan as this was not specifically required in any national or municipal legislation or regulations.

Seven of the respondents used lean construction tools. Several countries—such as U.S., U.K. and China—have achieved significant advantages by following lean construction principles. But the [approach](#) in South Africa seems underutilized because of technical and cultural constraints.

The remaining three respondents indicated that their companies were planning to start using lean construction tools.

What's next?

There appears to be widespread awareness of lean construction and its advantages in minimizing waste in Gauteng. But there's still room for more companies to use the approach and to explore a broader range of tools.

The greatest challenges to implementation lie in poor supervisory capacity, low levels of skills in the labor force, cultural diversity in establishing levels of quality, late issue of information and shortages of materials.

One of our recommendations is that training and education of site workers could make a major contribution to waste control and prevention.

Gauteng's landfill sites are rapidly reaching capacity and there is a

scarcity of potential sites for new landfills. The construction industry should therefore take a more environmentally responsible approach, as a major contributor of waste.

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Provided by The Conversation

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