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The feasibility of using rubble masonry concrete on dam structures during dam rehabilitation in South Africa to increase productive labour opportunities.

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Abstract

Unemployment is currently at a high level in South Africa. The Dam Safety Rehabilitation Programme was started in 2005 with the aim of rehabilitating dams belonging to the Department of Water Affairs. Within the ambit of this programme, 33 dams have been rehabilitated as at December 2012, with a further two dams scheduled for completion at the end of March 2013. Several rehabilitation projects have been completed using labour-intensive methods as opposed to conventional construction methods. The labour-intensive methods used on the dam rehabilitation projects include the use of rubble masonry concrete and brickwork as opposed to using conventional construction methods, for example, mass- and reinforced concrete. The aim of the research is to probe the impact of the labour-intensive rehabilitation methods as compared with conventional construction methods. Five dam rehabilitation projects were investigated for this project. Three rubble masonry concrete dam rehabilitation projects were researched in Limpopo Province, namely, Molepo Dam (spillway), Chuniespoort Dam (spillway and parapet wall) and Mashashane Dam (spillway). Two other dam rehabilitation projects were included for comparison purposes: Klein Maricopoort Dam (in North West Province), a conventional concrete spillway project, and Albert Falls Dam (in KwaZulu-Natal), a brick parapet wall project. This research explores three key areas, namely, production rates, cost and productivity. The findings of the research may be generalisable to other labour-intensive construction on dam rehabilitation projects. The findings indicate that production rates (man-hours/m^3), decrease with larger volumes of rubble masonry concrete placed. When comparing rubble masonry concrete construction with conventional concrete construction, there is an increase in job opportunities created. The costs of construction using rubble masonry concrete compared with conventional concrete using the same in-house public sector contractor were similar in terms of ZAR per m^3. The rubble masonry concrete structure constructed by the private sector contractor cost less than the rubble masonry concrete structures constructed by the in-house public sector contractor in terms of ZAR per m^3. Various reasons for the price difference are identified in the research project. Productivity (m^3/person/day) was measured for the different rubble masonry concrete sites and it was found that the private contractor's productivity rate was well above the productivity rates of the in-house public sector contractor's projects. The research report highlights various reasons to explain this anomaly. The importance of an incentive scheme to boost productivity on a labour-intensive project is highlighted. The findings of this research project may provide

a guide for future decision making into the use of labour-intensive constructive methods for dam rehabilitation. The research concludes that labour-intensive rehabilitation of dams should be continued since it results in a technically sound and cost-competitive product and creates more productive labour opportunities per unit of expenditure.

Keywords

In-house contractor rubble masonry concrete dam construction
Public sector contractor rubble masonry concrete dam construction
Private sector contractor rubble masonry concrete dam construction
Labour-intensive methods of dam construction
Labour-intensive rubble masonry concrete dam construction
Productivity of labour-intensive methods of dam