



ABSTRACT

Transnet National Ports Authority (TNPA) is responsible for the planning, improvement, development, and maintenance of port infrastructure. TNPA owns landside and waterside or marine infrastructure across nine commercial ports in South Africa, with the aim of achieving a World-Class Port status. The ports achieved a Grade B minus for the 2022 South African Institution of Civil Engineering (SAICE) Infrastructure Report Card (IRC). Over the past 5 years, TNPA port infrastructure did not meet the targeted asset condition rating of 85% according to TNPA's Asset Maintenance Principles and Procedures (AMPP). In addition, TNPA has experienced a decline in the number of trained personnel to inspect waterside infrastructure across all ports. To overcome the above challenges, the research will investigate the implementation of Digital Twin (DT) technology for smart port maintenance for the waterside infrastructure across the nine ports. Research has shown how DT technology can be used to improve infrastructure maintenance and provide online learning. This can be explored to investigate how ports can improve the current maintenance strategies and train employees to retain port maintenance skills.
