**NEWS ARTICLE**

Digital tools can help unlock the full potential of South Africa’s declining freight rail system

**30 October 2023:** State-owned Transnet reported a loss of R5.7 billion in 2022-23 and a decline of 23.6 million tonnes in rail freight, down to 149.5 million tonnes. “The impact of such underperformance is having a knock-on effect on the economy due to the constraints it is placing on major mining and logistics companies. Its revenues are down, resulting in a reduction in potential tax collection. The government urgently requires the revenue to fund investment, economic growth and social development,” says **Chris Britz**, Director: Transportation and Leader of the Transportation Business Line in Africa at [AECOM](http://www.aecom.com).

There are several reasons for this underperformance, notes **James Anafi**, Head of Rail, Africa at AECOM. A major contributor to the decline in rail freight traffic volumes is the poor state of rail infrastructure across the country. The rail network can benefit from solutions such as Enterprise Asset Management (EAM) to integrate the asset management activities of multiple disciplines within the rail environment. A well-functioning EAM system would guarantee, for example, that when addressing a track fault, any necessary interventions in the same line section are coordinated, reducing the need for more frequent line outages, which incur substantial opportunity costs resulting from loss of use of the asset.

Given the multidisciplinary nature of rail, EAM has been shown to be very useful to streamline the management of rail assets by harmonising assessments and interventions of the various disciplines involved in rail operations and management. It allows the various disciplines to collaborate effectively to deal with issues that affect the same section of track, while ensuring that each discipline’s needs are met. This usually requires digital tools to aid in data acquisition, processing and managing the interaction of the various collaborating disciplines.

“We can assist rail organisations to rollout effective EAM and other digital systems to improve their operations,” says Britz. AECOM, for example, stands to play a critical role in providing the necessary engineering expertise to affect a significant turnaround at Transnet. The globally trusted infrastructure consulting firm has broad capabilities in both freight and commuter rail and is ranked #1 globally in transit and rail.

“We have successfully carried out significant work in the railway sector, in both passenger and freight rail globally. This includes sizable projects in Africa,” notes Anafi. It recently completed a feasibility study for one of the biggest rail projects on the African continent, a 1 522 km link between landlocked Ethiopia and Sudan. It is also currently involved in a large-scale mega project in the Middle East, where it is designing both passenger and freight rail systems.

“Our local experience and knowledge, combined with our global footprint, allows us to bring appropriate expertise and knowledge from all over the globe to our projects, which assists us to deliver a quality service for our clients,” says Anafi. He points out that the fundamental issues leading to the decline of rail freight in South Africa “have been experienced elsewhere and solved. We are aware of what has worked and what has not worked, which allows us to bring those useful solutions to bear locally.”

In working with clients, AECOM gets to know them thoroughly to establish their existing situation and understand where they need to evolve to. It is then able to formulate solutions to assist them achieve their aims. “Our solutions typically incorporate knowledge and experience gained through our global work. They are specifically tailored to suit a particular client and project,” says Anafi. A good example is the digital tool AECOM developed to enable site teams in Ethiopia and Sudan to conduct the necessary site reconnaissance safely and efficiently during a period of civil unrest in the region. “It enabled us to fulfil our client and project requirements in spite of armed conflict and insecurity in the region,” highlights Anafi.

“Typically, our designs are done digitally, so we have a digital design that allows us to simulate how it will function,” says Britz. “It shows the client what they can expect from the infrastructure. If they need any adjustments made, we can actually show them before the infrastructure is built what they are going to get.” As an extension of the digital design, a ‘digital twin’ of the infrastructure allows AECOM to simulate the behaviour after construction, which is important to give an indication of the lifecycle management of the assets.

It can even predict the behaviour of the infrastructure over time to determine its maintenance needs and diagnose the root causes of problems. “Using this digital approach is particularly useful because it allows us to manage the operation and maintenance of the assets without overly disrupting their use to carry out physical monitoring and inspection,” says Anafi.

A digital twin is particularly useful for freight rail, according to **Kagiso Letlala**, a former Transnet employee who joined the team this year as a senior railway engineer and brings significant experience from a public sector perspective. The consultancy continues to invest in its rail expertise, including **William Makwela**, a railway designer who has worked on major international projects.

Freight rail requires predictive maintenance to optimise its scheduling and reduce its downtime, for which a digital twin is an ideal solution. Other digital tools can also provide a means of real-time monitoring on the condition of the infrastructure and identify some of the safety risks and bottlenecks that must be prioritised.

“The simulations we can get from these digital tools and the Internet of Things (IoT) can help us to mitigate some of the challenges facing freight rail in South Africa, inclusive of vandalism, and try to tackle them proactively,” says Letlala. The application of digital tools will allow rail freight to continue to grow. “We must harness digital tools more as an immediate solution to upskill and improve the human capital index of the country.”

Anafi highlights that freight rail is a highly competitive means of transporting heavy and bulky goods over middle to long distances. “Our economy is very much dependent on the transportation of freight over significant distances due to the size of the country and our economic dependence on mining, manufacturing and industry, which all need to move bulky goods.” For example, iron ore mined in the Northern Cape must be railed over 800 km to the Port of Saldanha for export.

“Freight rail is a perfect means of doing that, and you can imagine the economic benefits we get from such an operation,” adds Anafi. Hence, freight rail needs to work well. South Africa already has a vast rail network, one of the largest in the world, which shows the significance of freight rail. It reaches every corner of the country.” However, a major challenge is its operating model of being run by a monopoly whose vertically integrated operations means that it controls the entire freight rail value chain. The fate of the country’s freight rail sector rests entirely in the hands of just one organisation.

“There currently is not significant private participation; instead, there is a State-owned monopoly that handles everything. This has obviously led to inefficiencies and over-concentration on some aspects of the business that are well suited to the current operator to the neglect of other also important aspects that could be better handled by private operators,” says Anafi. There has been a strong focus over the years on the transportation of bulk minerals like iron ore and coal, with less attention paid to other important aspects like general freight and agricultural produce, which have strict requirements in terms of delivery times and preservation.

While Transnet itself might not be well suited or interested in some niche rail freight sectors where it lacks required expertise and experience, these sectors stand to generate much-needed employment and economic growth if the operating model is upgraded to allow for private participants who can efficiently handle them. “It is a much better way to handle the situation so you can deploy expertise in these niche sectors to oversee them. It will unlock some of the growth potential inherent in the less utilised parts of the network,” says Anafi.

Letlala adds: “Freight rail contributes directly to the economy and therefore it is critical for it to be reliable and efficient. Our unemployment rate is skyrocketing, which is why we need the freight rail sector to achieve its full potential. It will also reduce the number of trucks we have on our road network and assist mining houses and other industries to get their commodities to port for export.”

“Freight rail has a good role to play in the transport mix in the country, especially in allowing other modes to be effective. If freight rail functions well, it will attract all the railway friendly freight away from roads, reducing bottlenecks caused by trucks and potential accidents,” says Anafi. He concludes that boosting the freight rail system will have a direct impact on the efficiency of South Africa’s ports, in addition to the wider ripple effect on all related infrastructure and the entire economy.

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**Notes to the editor**

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