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A Stratified Systems Framework for the North-South Rail Corridor in Southern Africa
(Business Model and Concept of Operations)

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ABSTRACT

The North South Corridor (NSC) runs from the southern Democratic Republic of the Congo (DRC) to the ports of Southern Africa, connecting the DRC, Tanzania, Zambia, Zimbabwe, Botswana, Swaziland, Mozambique and South Africa (RSA). The notoriously high transport costs on the NSC, compared to other major regions of the world, is a serious limitation on the economic development of the SADC region.

While total NSC (road and rail) freight traffic volumes have increased, the rail portion has declined. Rail volumes on the NSC have dropped by 80%, while rail market share has dropped by more than 67% between 1990 and 2016. The purpose of this study is to determine what has caused this dramatic decline and what can be done to reverse the trend.

By applying a systems approach, the NSC-Rail System was analysed from a business model and a concept of operations (CONOPS) point of view. A mixed-method research design which included both a qualitative and a quantitative element was used. The study provided an understanding of the NSC-Rail System with its multiple interacting sub-systems and context elements. It also provided a means of conceptualising the factors impacting its business model.

In the Stratified Systems Review process, Node Flow Mapping highlighted the numerous discontinuities in the NSC rail corridor and the sharp contrast in traffic density north of the RSA rail network. The Viable Systems Model analysis showed that the system fails at the Coordination (level 2) and Optimisation (level 3) levels of a viable system. Value Stream Mapping (VSMp) identified the non-value adding delays caused by customs clearances at the multiple border crossings and identified locomotive and crew change-over points as major causes of transit delays. The VSMp indicated that the rail transit time between Durban and the DRC should be circa 8 days as opposed to the reported the 30 days rail transit time.

The research concluded that the operations of the sovereign rail operators must be aligned and optimised at system level. Lack of information sharing and communication problems are blamed on the language barriers between the operators along the corridor. The business model must address all the elements required of an end-to-end transport system. Key elements to improving the NSC-Rail System are inland dry-terminals, security of freight, system effectiveness and operational efficiency, competitive pricing and dependable, short delivery times.