



## **Community Participation Model for the Re-Electrification of Railways in South Africa and its possible impact on Youth Unemployment**

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### **Abstract**

*This paper looks at Community Participation (CP) in large infrastructure projects particularly in South Africa directed at the South African rail network. In recent years there has been increased theft of railway infrastructure including the rail track equipment and overhead equipment. This paper firstly looks at the definition of the term CP and its importance especially when considering the current trends of youth unemployment, inequality and poverty in the region. Secondly the paper looks at the possible reasons for the theft of the rail infrastructure and possible areas of community involvement. Thirdly the paper looks at possible ways in which unemployed artisans, technicians and engineers could be involved in the re-electrification of the network which is defunct in some regions of the country. The author also considered the reasons why community members would participate in activities related crime, vandalism and destruction when they would possibly need to be transported by the same rail network at relatively cheaper costs (as opposed to minibus taxis and public busses) and added convenience. The general public is also aware of the movement of supplies (foods and products) and commodities which are transported by freight rail and form an integral part of the national rail network. The paper also looks at the brief history of community participation in general with some references within the country and from the USA and then looks at approaches used in India where CP in the rail network is encouraged. Focus is then directed towards possible CP implementation in the South Africa rail network. Later, a pragmatic model of CP is proposed for the re-electrification of the South African rail network, hoping that such a model could be used to impact youth unemployment with regards artisans, technicians and engineers who are currently in need of practical work experience and related job opportunities. Finally, recommendations are proposed to extend the scope of CP with a view to include some planning and design aspects of projects that with the help of the higher education and TVET sector could possibly reduce the negative impacts of youth unemployment.*

**Key Words:** CP, re-electrification, rail network design, youth unemployment

## **Introduction**

Community Participation (CP) in this paper refers to community engagement in project planning, delivery and monitoring in large infrastructure projects particularly in the rail sector. The paper also refers to re-electrification of railways which implies the supply of electrical energy to parts of the rail network that have been defunct and damaged and to restore and expand the said network using new technologies, where possible. Kinyata & Abiodun (2022:1) state that CP “in project development is about ordinary citizens assessing needs and participating in project planning and budgeting, implementation and monitoring” and that “this improves public resource management and reduces corruption”. Noting the dire state of youth unemployment across the region (Golub & Hayat, 2014; AfDB, 2015), where ACBF (2017:70) claims that up to 50 % youth unemployment in South Africa and above 30% for Botswana, Namibia and eSwatini, and the need for up-skilling the workforce, CP is needed to broaden the reach and possibly reduce unemployment during project execution. Further, B2B Central (2020) states that:

communities are an integral part of any infrastructure and construction project, they must be seen as rightful participants and the different voices that exist in every community need to be heard – women, the youth, the aged, the disabled, etc. Firms and contractors need to be prepared to spend time on meaningful and effective public participation and on developing enterprise and supplier development programmes for every project so that they can subcontract to local SMEs and leave a legacy when the project finishes and they leave the area.

Burns, Heywood, Taylor, Wilde and Wilson (2004) also highlight that CP “adds economic value both through the mobilisation of voluntary contributions to deliver regeneration and through skill development, which enhances the opportunities for employment and an increase in community wealth”.

The contention of this paper is that there was probably insufficient CP engagement when the rail network in South Africa was planned and constructed and that because of this disconnect with communities, vandalism and theft have ensued. The paper goes on to look at different aspects of CP in an effort to model a framework that could be used to re-electrify the network while also reducing youth unemployment and expanding skills transfer (Jubane, 2020; Nason, 2019).

### **Theft and Vandalism of SA Rail Network Status Quo**

In recent years there has been gross deterioration and theft of the main commuter network across South Africa (PMG, 2020). The freight rail network has also suffered some major damage (EN, 2022a). The state commuter network is managed by the Passenger Rail Agency of South Africa (PRASA), while the freight rail service is mainly managed by TRANSNET.

Some of the factors that have led to this decline are (1) Increased Unemployment and the tendency towards crime where some parties see the network infrastructure as an easy target for theft, then to sell the stolen equipment for cash to scrap metal dealers, (2) Load Shedding, where because parts of the network are “off” during load shedding, criminals are able to access equipment like Copper cables and the overhead conductor more easily (as opposed to handling high-voltage areas), (3) Lack of Maintenance leads to broken sub-stations and rail equipment, if not maintained, criminals take advantage and remove all goods that can be exchanged for cash etc. and (4) Lack of Security – some lines and stations have been left unguarded due to poor management and contractual issues. In recent months there

has been a renewed interest in re-investment and re-electrification (EN,2022a; EN, 2022b) of the damaged rail network not only in South Africa, but across the Southern Africa Development Community (SADC).

### **Some Examples of CP in Infrastructure Projects in SA**

Having noted the benefits of CP, above, some examples of CP were briefly reviewed in order to highlight possible learnings of how to implement such initiatives on large projects. The construction of the Hammanskraal Pedestrian Bridge over the R101 in Hammanskraal, Pretoria (Rathenam & Dapub, 2017) was reviewed as well as the results of a CP housing development study in the Western Cape (Khan & Haupt, 2006). A project of relevance to the rail sector namely the Gautrain was also reviewed and highlighted below. Some of the main learnings from these projects is that CP is not necessarily easy to manage and implement but is crucial for the success of projects and should be used as a tool for community cohesion and positive stakeholder management. As such CP should be used to create and generate employment within and around projects and to ensure that projects that supply services to communities like rail, road, water, electricity and sewage networks do not become white elephants due to non-maintenance and neglect (Kinyata & Abiodun, 2020; Falconer, 2020).

### **Some Examples from USA Higher Education**

The Interdisciplinary Design Engineering and Service (IDEAS) program adopted by some universities in the United States of America is a particular case in point of CP. “This program supports and promotes community-based projects as a vehicle for providing students with real-world experience working with clients to solve need-based problems” (Davis, Krishnan, Nilsson & Fylling Rimland, 2014). Another such program is the Engineering Projects in Community Service (EPICS) program mainly for high school students (this model may also be applicable in the local TVET environment) (Nason, 2019). This is “an engineering, service-learning program that engages high school classrooms in working with stakeholders in their communities to develop solutions to real-world problems” (ASU, nd). Coyle, Jamieson and Oakes (2005) state that besides subject matter knowledge community-based projects “offer a worthy experience of engineering design, multidisciplinary team exposure, sufficient time to learn professional skills, personalised mentoring and exciting technical challenges” (Jubane, 2020). Ruth, Hackman, Brewis, Spence and Luchman (2002) state that such programs enable “shifting perceptions of engineering” where students gain “key transversal skills”.

### **Lessons Learned from Indian Railways and the Gautrain**

It would seem that in the developing world Indian Railways has shown leadership in the CP field by encouraging partners from both private and public institutions (Transfin, 2020), and citizens to join in the, operation, maintenance and development of the rail network (PTI,2015; Mint, 2021; Vijay Kumar, 2021). Indian Railways also invites innovative ideas from the youth and those outside of their employ (Government of India, 2021). The approach used by Indian Railways appears to be comprehensive in tapping in to the youth culture and community engagement and should be adopted by South Africa (and other African countries) especially with regards to the pending re-electrification of rail networks. The Gautrain rapid rail system (upto 160 km/hr) located in Gauteng province currently has “two main routes on the 80 km-long networks: a north-south line from Hatfield

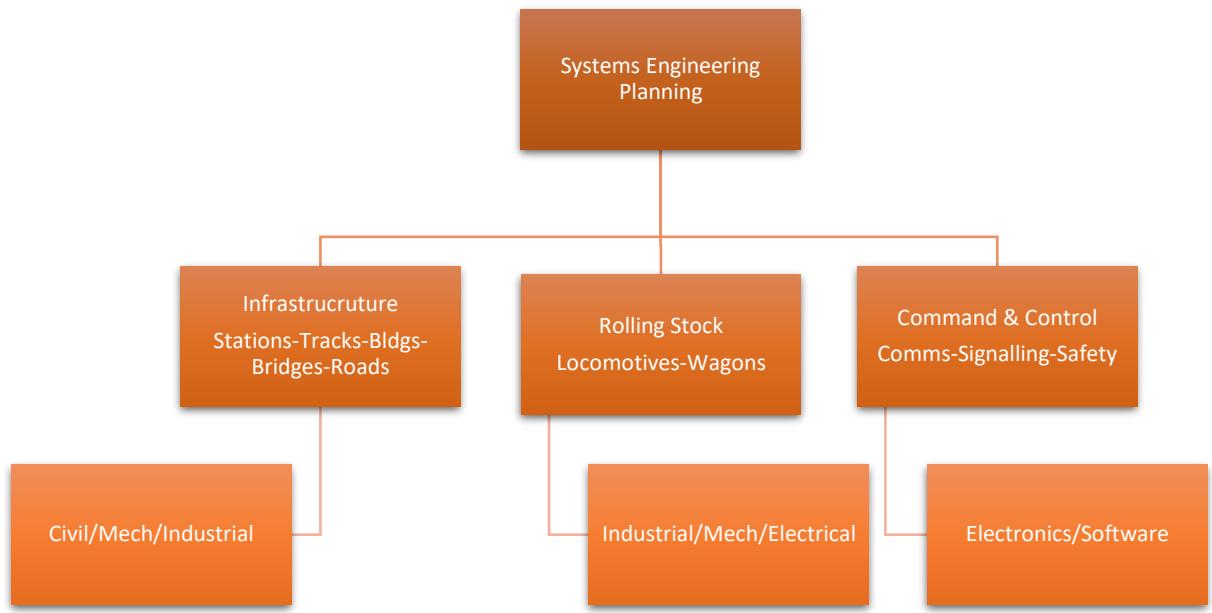
to Marlboro and an east-west line from Park Station (via Marlboro) to OR Tambo International Airport” (RT, 2020). The project “was the subject of extensive planning, following feasibility studies in the late 1990s to produce the first plans for a north-south and east-west rail route serving” the province (RT, 2020). “Operations between Rosebank station in Johannesburg and Hatfield (Pretoria) started on 2 August, 2011. The remaining section became operational in 2012” (RT, 2020).

Noting the recent comments from the new Gautrain Chief Executive Mr. William Dachs (Buthelezi, 2021) that he wanted to: (1) create a sense of joint ownership of the high-speed train”, (2) When the Gautrain concession ends in 2026, communities around the stations to have a slice of the pie, and (3) involve taxi associations, too, in a bid to arrest vandalism of Gautrain operations. These statements by the CEO showed renewed interest in CP that may not have been considered when the rapid rail project was initiated in 2013 (GMA, 2015).

Recently other initiatives such as the Graduate Development Programme have been undertaken (GMA, 2021). Other community involvement initiatives have also sought to encourage socio-economic development of areas around the various Gautrain stations (GMA, 2015). Buthelezi (2021) when quoting the CEO states that “for Gautrain to succeed communities must get a slice”.

### **Railway Design & Build Projects are multi-disciplinary**

Figure 1, shows some aspects of railway engineering multi-disciplinary projects (TfNSW, 2018). It should be noted that during the planning of such bulk infrastructure projects a systems engineering approach is typically used (INCOSE, n.d.). Because of the complexity of such projects a design and build approach is used with (Original Equipment Manufacturers) OEMs, governments and private parties being part of the important stakeholders. In an attempt to categorise the engineering components of a typical railway project, infrastructure, rolling stock and command and control components are used to address physical buildings like stations, bridges and roads etc. Rolling stock would imply subjects related to locomotives and wagons, whether electric, diesel or hydrogen powered. Command and control refers to issues around safe operation relating to communications, railway signalling and transport safety. As can be seen from these categories related to engineering implementation the disciplines of civil, mechanical, industrial, electrical and electronic and software engineering are integrally involved in the rollout of railway engineering projects (Ogunsola, 2017). It should be noted that softer strategic issues like stakeholder engagement and design management are not addressed, here.

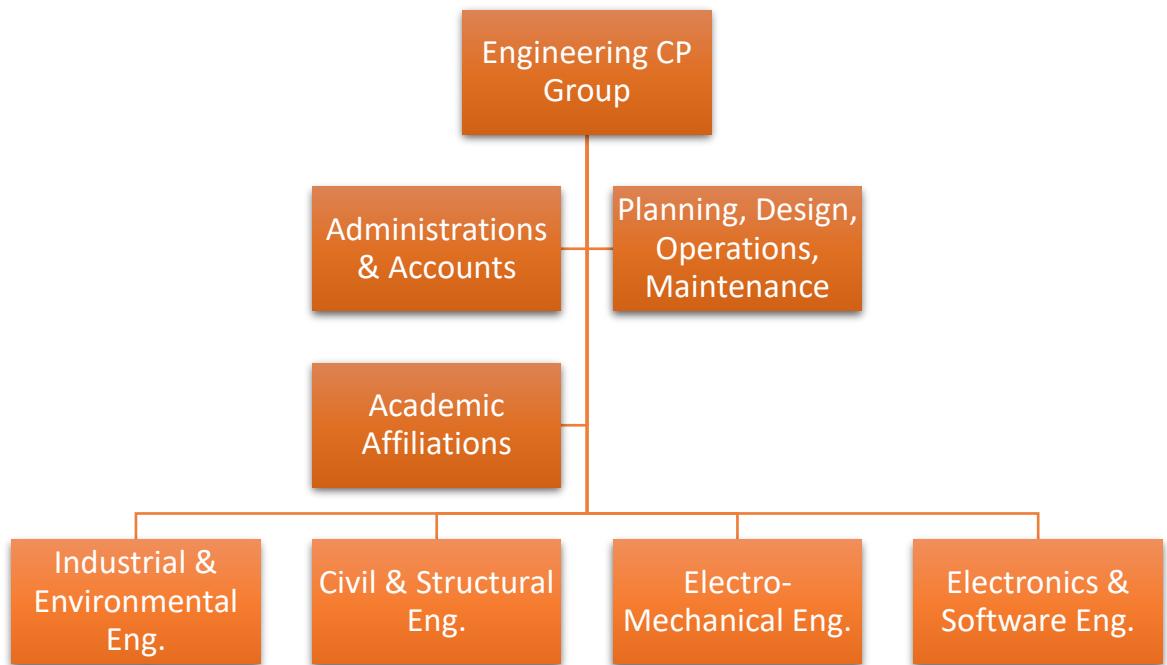


*Figure 1: Railway Engineering Multi-Disciplinary Aspects*

### **Proposed Re-electrification Community Participation Model**

The proposed model depicted in Figure 2 attempts to have an engineer led CP group that would use the re-electrification project as a means to build capacity and knowledge around railway engineering (Khan & Travedi, 2014). As opposed to being part of the OEM for each major component of the railway infrastructure like the track and overhead equipment etc., the Engineering CP Group (ECPG) would consist of engineers, technicians and artisans of different disciplines that would attempt to study and learn how the system is to fit together and perhaps recommend improvements (WBG (2017) or other ways to execute the work at hand. This may appear tedious and time consuming, but just having the opportunity to be exposed to the complexities of such projects may encourage interest in the railway engineering field. Very often such projects are executed by experts who are brought in to deliver the end-product with very little skills-transfer. The projects are completed efficiently and within stipulated timeframes and are left to locals to operate after the concession period.

The design work is very often done up-front, so the locals are left to learn from operation of the plant. If an ECPG is established when the main tender is won and begins to be involved from the onset of the project, more value may be created especially if the engineers, technicians and artisans belonging to the group are carefully selected from communities along the re-electrified rail network.



*Figure 2: Re-electrification Community Participation Model*

## Conclusion

This paper attempts to propose a model for Community Participation of engineers and other technical partners for the intended re-electrification of the rail network in South Africa and its surrounds. By reviewing models found in South Africa, the United States of America and India a pragmatic framework is proposed to create youth employment that may be of value for such future projects, as opposed to policy centered approaches (Fox & Gandhi, 2021; Maskaeva & Msafiri, 2021). It was noted that the current vandalism of the network could be as a result of a lack of community participation in the planning and design of such projects. If the re-electrification of the rail network in South Africa does proceed a ECPG is proposed that would be multi-disciplinary and integrated into the project execution team. This group would attempt to record lessons learned, be informed of the complexities of railway engineering technology, attend project and design meetings and hopefully advise on project implementation improvements.

It should be noted that the ECPG should attempt to embed itself in the fabric of the re-electrification project and should provide a timeline of the project tasks and lessons learned as the project progresses. Because this type of work is rarely performed by the main contractor and neither by sub-contractors, the expected result could be of great value to the country and to the engineers, technicians and artisans involved in terms of theoretical and practical knowledge gained.

Noting the IDEAS and EPICS programs operational in the US higher education sector, proves the value that could be derived from such community participation projects with access to academic affiliations. The interest shown by Indian Railways in community participation projects to ensure the longevity and expansion of their rail network, shows the importance and criticality of such projects to provide sustainability into the future. The Gautrain rapid rail network is an excellent recent example of community engagement but may lack the onboarding of talent with regards the initial planning and design of the proposed network expansion. Finally, the model proposed seeks to provide fresh thinking for the implementation of engineering CP in railway network deployment notwithstanding contractual and

intellectual property constraints. Noting that combating youth unemployment requires a strategic and comprehensive approach needing inputs from diverse sectors including government, private industry, education and community partners (Duncan- Williams, Meyer, Sinodumo-Nkosi & Angelucci, 2021; Nason, 2019; Norton & Norton,2020).

## **Recommendations**

- 1). The typical scope of community participation which focusses on end user services and wellbeing should be broadened to include engineering design and planning especially when large infrastructure projects are to be rolled out.
- 2). Aspects of entrepreneur development, the tackling of youth unemployment and under- employment, skills development and knowledge creation can be addressed by selecting local community participation of engineers, artisans and the like in the execution of bulk infrastructure projects resulting in better stakeholder management and improved sustainability.
- 3). Involvement of the higher education and TVET sector in such community participation activities under the leadership experienced engineering personnel should engender the creation of an increased pipeline of skilled engineering and allied workers ready to engage the immense challenges faced by the youth of Africa, today.

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