

Using GIS environment as a remedy to solve Rail network in West Africa into a global village

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1.0 Introduction

- Railway construction was started by most of the colonial government which colonised the sub-region in the late 1800's and the early 1900's. Most of the railways were developed to gain access to the rich agricultural and minerals resources in the hinterland, orienting its network mostly to the seaports. Despite these primordial advantages, rail transport have, at all times been rightly or wrongly, regarded as high spending that put a strain on the financial resources of states.

- ECOWAS which is made up of the Heads of State of West African countries have initiated to embark upon the railway network sector in the sub-region into a global village.
- Several solutions were devised that have to be implemented in most of the West African countries ranging from structuring, privatization and management agreements, all in an attempt to steer the rail enterprises towards commercial competitiveness and financial viability.
- The problems continued to exist with the recommended solutions producing unexpected results.

This Presentation seek to address some of the problems which of course is peculiar to other West African states and give suggestions using GIS environment as a remedy.

2.0 The West African States



2.1 West African Rail Transport

Network

■ Benin	578km
■ Burkina Faso	622km
■ Cape Verde	-----
■ Chad	-----
■ Cote d'Ivoire	660km
■ The Gambia	-----
■ Ghana	953km
■ Guinea	1,115km
■ Guinea Bissau	-----

■ Liberia	490km
■ Mali	729km
■ Mauritania	-----
■ Niger	-----
■ Nigeria	3557km
■ Senegal	906km
■ Sierra Leone	84km
■ Togo	525km

TOTAL 10,219km

3.0 Rail Transport Operations in West Africa

- After Independent from our colonial masters, West Africa states established railway companies with operational autonomy from both financial and technical perspective.
- As the years went by, these companies began to portray serious managerial weakness which upset their financial equilibrium and seriously compromised their survival, notably as a result of:

- Government interference with Management structure
- Chronic deficits, obliging the state to subsidize the enterprises to ensure the financial equilibrium for the sustainability of rail transport.
- Over-bloated workforce
- Absence of investment in infrastructure and equipment (Under funding)
- Mismanagement
- Locomotive health and well being (lack maintenance)
- Irregular staff training
- Unfair competition with other modes of transport particularly road transport.

CASE OF NIGERIA

- In Nigeria, the Nigeria Railway Corporation significantly reduced its running cost and transferred to the private sector of the activities that are not strictly relevant to rail transport business. The process is still ongoing, and the Nigeria Federal Government is backing these actions with massive investment. The workforce decreased from nearly 35,000 in 1988 to around 6,020 in 2005. A huge investment programme has been put in place with international cooperation support particularly for the rehabilitation of some 4,300 km rail road, procurement of new locomotives and rehabilitation of the rolling stock.

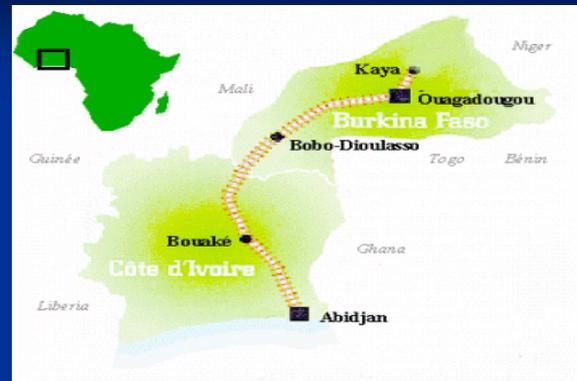
CASE OF NIGERIA



CASE OF COTE D'IVOIRE AND BURKINA FASO

- The activities of the Cote d'Ivoire/Burkina Faso joint rail network of 1260km leased to SITARAIL got underway in August 1995 under a lease agreement which provided for the creation to two property companies; one, to cater for the interest of the state in railway sector, and the other, to implement a substantial part of the network rehabilitation and modernization programme. The equipment and infrastructure remain the property of the state while the concessionaire takes charge of maintenance.
- Since the events of September 2002 in Cote d'Ivoire, SITARAIL has been faced with operational difficulties which disrupted the activities of the network and, by agreement between the two states, led to the deferment of some provisions of the agreement.

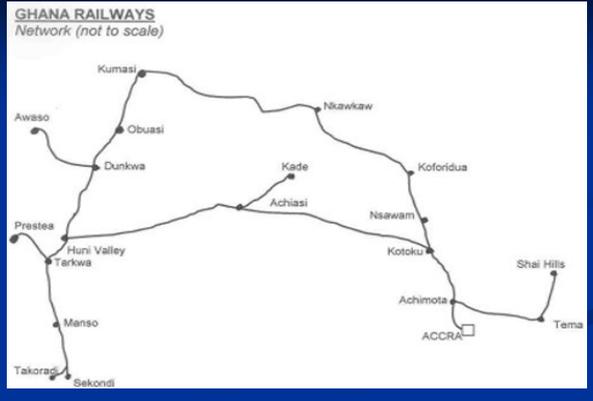
CASE OF COTE D'IVOIRE AND BURKINA FASO



CASE OF GHANA

- The Government of Ghana (GOG) has launched a far-reaching program of trade and investment promotion designed to make Ghana a gateway into the Western African sub-region. Ghana's railway sector is expected to play an important role in this initiative. The Ghana Railway Company Limited currently has a very small share of the national transport market, with 4% of freight and 1% of passengers. Over 90% of the freight traffic is bulk minerals - bauxite and manganese - transported from the mines at Awaso and Nsuta to Takoradi port for export. Most of the other traditional freight commodities such as timber, cocoa, petroleum products and cement, as well as intercity passenger traffic, have been lost to road transport.
- As part of the transport policy strategy approved by Cabinet, GOG has decided that Ghana Railways will be managed and operated by a private operator, under a concession arrangement. The implementation of the concession is placed under the responsibility of the Divestiture Implementation Committee (DIC) of GOG in collaboration with the Ministry of Roads and Transport.

CASE OF GHANA



CASE OF GHANA

- | | | |
|---|----|---|
| ■ Tarkwa - Prestea (January 1911) | - | Passenger service suspended in 1998 |
| ■ Nsawam - Koforidua (1915) | - | Passenger service suspended in 2001 |
| ■ Koforidua - Tafo (1918) | - | Passenger service suspended in 2001 |
| ■ Tafo - Kumasi (1923) | - | Passenger service suspended in 2001 |
| ■ Huni Valley - Achiasi - Oda (Oct. 1926) | - | Passenger service suspended in 2001 |
| ■ Oda - Kade (December 1927) | -- | Passenger service closed in 1985 |
| ■ Kojokrom - Takoradi (1928) | - | in Operation |
| ■ Dunkwa - Awaso (1944) | - | in Operation |
| ■ Achimota - Tema - Shei Hills (1954) | - | Closed in 1995 |
| ■ Achiasse - Kotoku (February 1956) | - | Passenger service suspended in 1998 |
| ■ Accra - Tema (1999) | - | (Reopening not realized) |
| ■ Takoradi - Kumasi and Dunkwa-Awaso | - | Passenger services suspended (high fuel prices in May 2006) |

4.0 GIS as a Remedy to Railway Problems

- Taking a look at the first phase of a GIS development in respect to the railway infrastructure, it can be seen that the first important thing about providing detailed asset information is to find out what the assets are and where they are located. Although it sounds really basic, this has proven to be not an easy task on many West African railways, because asset documentation was usually paper based, rather old, not regularly updated, inaccurate, inconsistent, and consequently unreliable.

- The railway infrastructures on many of the railways in West African states are more than hundred years old; and these hundred years there have been numerous reconstructions and changes performed both in track layouts and track structures along with other infrastructure elements. Unfortunately, these changes, especially those performed further in the past, most often escaped being recorded or were poorly documented. Also, assets were usually referred to using mileposts, which were proven to be wrong or imprecise. These things, along with retiring of the most experienced old engineers who were perhaps the only ones left who knew about these changes.

4.1 GIS the effective tool for management in the Rail industry

- In the Railway industry, geographic analysis is the key to making better decisions. Railways around the world uses GIS to manage key information for rail operations, maintenance, asset management, and decision support system.
- Railway GIS should include and combine all kinds of specialise monitoring, data collection like bridges switches and crossing, overhead lines, level crossings, tunnels, culverts, etc and should incorporate issues like environmental and hazard management and emergency response systems.

- Once integrated, the Rail GIS will serve the needs of all the parties that are in anyway connected to the railway system, such as the Infrastructure owners, railway contracting, traffic operating companies, or any other.
- The adoption of Rail GIS will make the rail system effective in these three categories:

4.1.A. ORGANIZATION

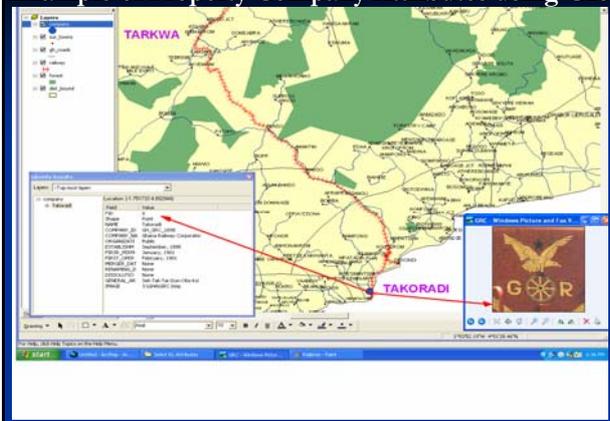
4.1.B. PUBLIC-PRIVATE PARTNERSHIP

4.1.C. STRATEGIC ORIENTATIONS

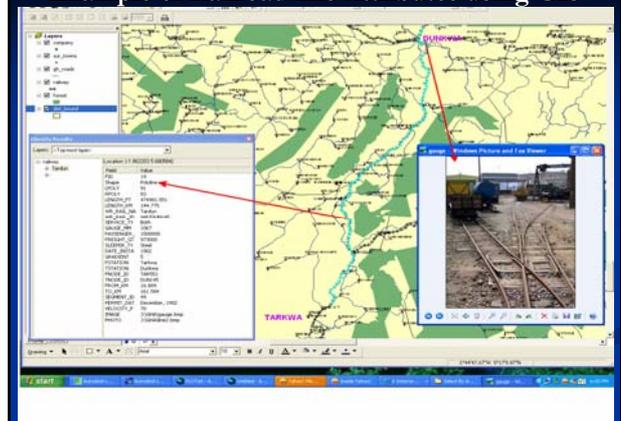
4.1.A. ORGANIZATION

- Experience has demonstrated the need to separate infrastructure management from rail road transport. Which should be:
 - **Railway Company**
The rail company is responsible for passenger and goods traffic operations in accordance with established security standards.
 - **Property Company**
Manage the unleased portion of the rail operation and the related activities that have not been over taken by the concessionaire as part of his/her operations.

Example of Property Company Attributes using GIS



Example of Railroad line Attributes using GIS

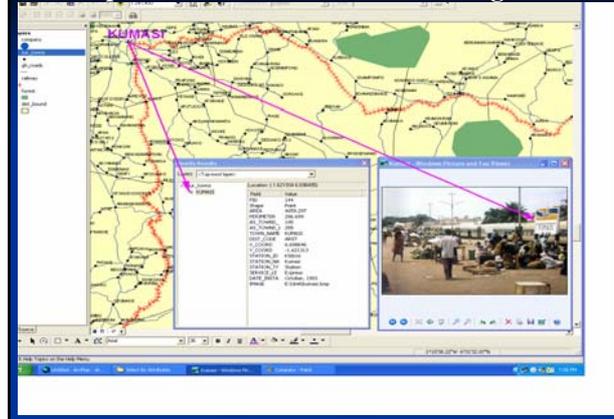


■ Regulator Agency

The regulatory Agency will have a very key role to play in this organization. It has authority over the **rail operators** and the **property company** in order to discharge the following functions:

- a./ Put in place a stable instructional legislation to regulate competition and market mechanism, thereby producing services at the least possible cost while ensuring the financial profitability of the enterprises in the regulated sector.
- b./ Coordinate the different modes of transport with a view to optimizing the material resource available.
- c./ Resolve cases of abuse and conflicts between operators
- d./ Protect the interest of consumers and ensure respect for security standards.

Example of Rail Station Attributes using GIS



4.1.B/ PUBLIC-PRIVATE PARTNERSHIP

- If GIS is implemented in the Rail industries of West African states whereby geospatial data are better maintained in a standard format, and are easier to search, analyze and represent, shared and exchanged freely, then productivity of the staff will improve and be more efficient. Therefore time and money are saved, and better decisions can be made.
- This package will then look very good and attractive for investors as well as private sector participation in ownership, funding and operations of the Rail network.

4.1.C/ STRATEGIC ORIENTATIONS

- If the Rail network into a global village in the West African States should be a reality, then the following must be adopted:
 - Railway Interconnections (Identifying International railway lines)
 - Rail Line Standards and Specifications
 - Standardization of Materials and Equipments, Maintenance and repair of towed materials
 - Human Resources Development
 - Implementation of GIS in the Rail transport System.

5.0 Conclusion

- The adoption of GIS is therefore vital that rail transport business undergo real transformation, both structural and organizational so that its package can be attractive for inputs from increased international, regional and sub-regional cooperation and the private sector, to enable the business to play its catalytic role in social and economic development of the member states.

Thank You for your attention