

CONTRIBUTIONS OF SURVEYING IN THE DEVELOPMENT OF REGIONAL INFRASTRUCTURES – AN AFRICAN PERSPECTIVE

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DEFINITIONS

Surveying - Mathematical science used to determine and delineate the form, extent and position of features on or beneath the surface of the earth. Includes determination of position by the use of Global Navigation Satellite Systems (GNSS)

Infrastructure – Assets such as roads, railways, airports, sea and river ports, canals, telecommunications and other basic physical systems of a country's population that make economic and social activities possible.

REGIONAL INFRASTRUCTURES AND SURVEYING

(a) Transportation

- **Roads and Railways:** Surveying involved in route selection, in collection of data for the calculation of quantities, and in setting out of the route.
- **Air transport:** Surveying used in selection of site for the runway and in its construction. GPS (Surveying) procedures enables aircraft to approach and land at airports using satellite technology.
- **Water transport:** Bathymetric surveys fundamental to port development and charting of navigation channels.

ENERGY INFRASTRUCTURE

- **Hydroelectricity:** Surveying involved in the selection of suitable dam sites. Surveying also used to monitor behaviour of dam after construction.
- **Natural Gas:** Surveying is involved in the selection of routes for gas pipelines and in setting out the pipelines.
- **Solar Energy:** Surveying is involved in the mapping of the location and distribution of field units powered by solar energy.
- **Power transmission:** Surveying required for the selection of routes for the long power transmission lines required for sub-regional power pooling.

TELECOMMUNICATIONS

- Surveying is involved in site selection for telecommunications installations, and location of telephone lines in fixed line telephony. Surveying, through satellite (space) geodesy, is involved in the launching of communication satellites

INTEGRATION OF CROSS-BORDER INFRASTRUCTURES

- (a) Earlier Efforts – the ADOS project: one of the primary intentions was to establish a common geodetic datum for the continent of Africa based on the US Navy Navigation Satellite System (US NNSS) TRANSIT. The ADOS project did not meet the above objective mainly because:
- simultaneous observation of widely separated points proved exceptionally difficult;
 - There were no set observing standards and procedures resulting in observations of unacceptable standards;
 - The project was planned almost entirely by the IAG and the international community with little input from African countries

INTEGRATION OF CROSS-BORDER INFRASTRUCTURES (COURT)



(b) Current efforts – the AFFREF project:

the main objective is to establish a unified datum by using the GPS method. Although the ITRS is the global terrestrial reference system officially adopted by the IAG, the WGS 84 system of the GPS was chosen because it is widely used and understood by several communities and is now comparable with ITRS at the centimeter level.

To avoid the mistakes of the ADOS project, it was decided to fully involve African countries in the exercise. Heads of national mapping organizations (NMOs) feature prominently at various levels of the project. African participation is further assured by the direct involvement of the three regional centres in Africa.

PROCEDURE FOR INTEGRATION



- GPS observations to be carried out on selected existing control points in each sub-region;
- A number of permanent observing stations in each country to be tied to the IGS permanent stations;
- During computations, these points and others will be processed with relationship to the IGS stations which are on WGS 84 datum thereby converting the sub-regional network to WGS 84 datum;
- An analysis will be carried out to establish a continental geodetic datum tied to WGS 84;
- Transformation parameters will be computed for use in the transformation of the national geodetic control networks.

SUMMARY



- Infrastructures exist in space and surveying is invariably required to obtain information on their positions which is necessary for the planning and execution of the associated projects. Further demands may be made on surveying in the case of cross-border projects because they may involve countries whose geodetic systems are based on different datums. Arrangements must be made for establishing a unified datum for Africa and for transforming existing networks into the unified datum.

THANK YOU FOR YOUR ATTENTION!

