OBSTACLES TO EFFICIENT DATA-SHARING IN A DIGITAL LAND INFORMATION DATABANK

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Abstract

Land data are being collected by different agencies at the Federal, State and local government levels. These data are expected to meet certain attributes e.g. accuracy, precision, currency, accessibility etc., to be able to serve the purposes intended. But, at these levels of collection and even within the levels, there are duplications and no particular standards or specifications. With the emerging technologies with various accuracies and precisions, the enthusiasm in data-sharing is very high but certain things must be taken care of. An exploratory investigation into efficient data-sharing in a digital land information databank was carried out. Our findings showed a lot of obstacles exist for efficient digital data-sharing. Such obstacles include: multiple and inaccurate control network, lack of feasibility studies, archaic nature of existing survey laws and regulations, poor enabling infrastructures and many others. These obstacles, it was found made data-sharing very difficult. Digital data were collected and are still being collected in different formats both in terms of instrumentation and techniques. Therefore, for efficient data-sharing, some of existing laws and regulations should be up-dated, multiple and inaccurate reference framework must be corrected and unified. Also, Nigerians must change their present behaviour and be filly disposed to reforms in the system.

Introduction

In Ono and Igbokwe (2006), it is evident that there is no sufficient and reliable land data in Nigeria. That is, no reliable land data either in analogue or digital form. In essence, it implies that Nigeria lacks the essential "fuel that drives the engine of growth and sustainable development of any nation as stated by Akinyede and Boroffice (2004).

Even if Nigeria is geo-data rich in the analogue form, she could equally be rated as information poor, since there is no efficient and effective means of engineering its sorting, evaluation, aggregation and management for proper use and applications. Inadequate and inaccurate land data/information breeds problems and once confusion arises on such data, land transactions, including development, become difficult. This situation has been responsible for the under-development and retarded growth of Nigeria, where administrative, social, economic, political and infrastructural planning and decisions are based on inefficient/defective land data.

Nigeria, therefore, needs to defy her present inertia towards the current positive change sweeping through the continents of the world in terms of digital systems. That is, the awareness of the central role of geographic data in nation-building and development and the universal surge in harnessing the ingredients of land resources for total revolutionization of the functions of state, for the benefit of the citizenry resulting from the ease in dissemination and facilitated application of geo-data. This ideal cannot be realized except through total automation of land data in the infrastructural denominations of geographic information system, land information system, cadastral land information system etc, on national basis.

Dale and McLaughlin (1988) pointed out some of the attributes of data (information) which are desirable and therefore good for sharing. These are:

(i) currency, (ii) precision (iii) accuracy (iv) verifiability (v) clarity (vi) quantifiability (vii) accessibility (viii) freedom from bias (ix) comprehensiveness and (x) appropriateness. This is amply represented in Fig. 1
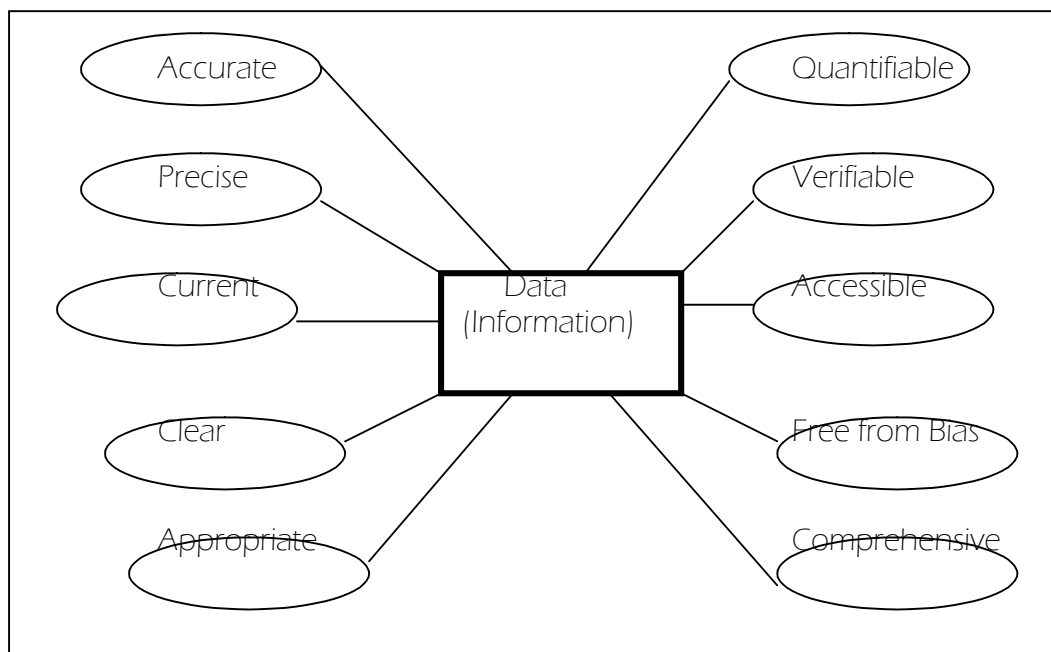

Fig.1 Desirable Attributes of Data

Therefore, the data being collected must seem to pass the above attributes, hence can be presented for sharing. That is, data that must be accessible in an up-to-date form, must provide measurement information to that standard and specification, must contain little or no error and guarantee for loses, must be free from ambiguity and all users must get the same answer to the same question, must relate to the potential user's requirements and numerical values obtainable, must be free from alteration or modifications to serve a selfish interest and must be complete in spatial content.

However, any bid to accomplish the above system is not without obstacles/problems. So, our existing digital land data with the way and mode of acquisition and management make data-sharing very difficult in our land data management. This paper therefore, explores these obstacles and exposes them. Also, it makes suggestions to eliminate these obstacles and provide way for an efficient data- sharing in a digital land information databank.

Background of the study and Findings

One major factor militating against the recognition of importance of geo-spatial data whether in analogue or digital is that the bulk of the benefits of the land data enterprise are intangible and not easily quantifiable in physical finances. Hence, Adeoye (1998) stated that most top government decision-makers and policy formulators do not as yet know the importance of land information to nation-building. And the fact remains that surveying and mapping technologies and techniques are capital intensive. It is discovered that those in charge of affairs have failed to create sufficient awareness of its existence and usefulness, coupled with the ineffectiveness of the system on its own.

Equally prominent among the causes of the handicap to developing surveying and mapping in Nigeria is that surveyors seemed to have slept over their rights over the years

resulting to professional/survey projects being subsumed in other professions like engineering, estate management, urban and regional planning etc. So, the surveyors have to gear up for relentless lobbying and direct participation in the decision taking of the nation. Most of the potential users of the products (digital-data) are equally scared of its technological complexity and prohibitive capital cost involved.

The land data and its products need a lot of aggressive awareness creation about its lucrativeness, and valuableness. These could come in form of seminars and workshops and being a part of the decision-makers. It is found that the present skeletal or pockets of implementation of the system are mostly among giant oil companies and few rich state governments. These do not truly augur well. Land information databank must be national in its implementation in order to achieve uniformity in all its ramifications.

Our investigations in this study have identified the following obstacles to efficient data-sharing:

- lack of sound feasibility studies
- absence of clear-cut national policy
- lack of appropriate coordination
- non-adoption of common standards
- some institutional issues
- use of multiple and inaccurate geodetic reference framework
- unavailability of multipurpose cadastre
- poor enabling infrastructure
- digitization of existing analogue land data land tenure system
- land use act
- existing survey laws and regulations
- lack of awareness of the usefulness of the system (digital land data)
- poor maintenance culture or agenda
- the behavioural nature of Nigerians

Findings and Details

At this stage, we engage in little details of some of these obstacles to see really the effects.

a. *Use of multiple and inaccurate geodetic reference framework*

In Nigeria, the problem of reference framework is rather complex. There are multiple inaccurate geodetic frameworks to which land data are based. Some data, analogue or digital are based on Minna datum, some others on either WGS84 ellipsoid or WGS72 ellipsoid (immediate predecessor of WGS84 ellipsoid), and some also on TP20 of no known reference surface. Nevertheless, the bulk of the control points in use for data are based on Minna datum. But with emerging technologies, land data existing and being gathered are based on WGS84 which is global in nature. The datums have different dimensions of reference ellipsoidal parameters.

Adaminda and Field (1985), Omoigui (1973), Ono and Igbokwe (2000), and Ezeigbo (2004) have stated that Minna datum suffers from scale and orientation problems. Ezeigbo (1990) stated that the geoid in Nigeria is unknown and therefore the fit of Minna datum to the geoid is uncertain. Emenike (1978) also added that the field surveys were carried out by several surveyors, working at different periods and employing varied types of instruments with varying precisions. Further, the values of initial coordinates of the origin point L40 were arbitrarily assigned, without ensuring that Laplace conditions were

satisfied. This is an obvious source of distortion of the geodetic framework based on Minna datum. It is noted that unlike the NTM and UTM projection systems which are mutually transformable, no transformation parameters and standard procedures have been adopted for transformation between the Minna datum and the World Geodetic System WGS 84.

Infact, the frameworks are not only defective, there are instances where the controls exist, the locational separation is such that they cannot ordinarily and conveniently be used in data acquisition. Emenike (1978) stated that while spacing between control monuments is 50km on the average, the traverse of the southern part of the country have not been tied to the defective Nigerian triangulation and traverse network. Invariably, we do not have a network with sufficient densification in the country. Coupled with this is that some controls are located on hills which even further make them inaccessible.

Hence, the integration of the existing digital land data in the country and effective data sharing would continue to be a dream, unless the above defects pointed out are rectified and the existing land data referenced to common, accurate, adequately, densified geodetic control network.

b. Poor Enabling Infrastructure

This can be looked at in two ways:
(i) Communication facilities, and (ii) Electricity supply, the two factors may be regarded as support services.

i.I   Communication facilities:

We identified that functional telecommunication system is very important for effective exchange of information among digital data operators, major computer networking and the general public. Inter-and intra-communication is necessary to facilitate creation of awareness of the existence of fundamental data sets and data-sharing proper.

Nigeria is yet to have a reliable telecommunication network that guarantees smooth and dependable communication, in spite of the recent boost through the GSM, which is bedecked in poor services. Most of the time, there are network failures, interconnectivity problems among the network servers. The services coverage is even poor and virtually non-existent in the rural areas.

ii.   Electricity Supply

Continuous supply of electricity is very essential for the operation of digital data sharing where the process of data acquisition (digitization, scanning), collection, storage, retrieved, processing and analysis need to be availed with uninterrupted flow of electricity. The operations of the computer systems, in whatever architectural networking mode they inter relate are energized by electricity. Even electricity is necessary for lightening the operational working environment in order to provide clear view to the operators of the system.

As at now electricity generation and distribution is epileptic and undependable and the substitution by the use of generating plants put the production costs high and consequently high cost of data to be shared. Finally, the present unreliable poor state of Nigeria's electricity generation/distribution and communication frame works cannot support effectively digital data-sharing in a digital land information environment.

c.   Digitization of Existing Analogue Data.

Digital data are also acquired through data conversion and which involves digitization of analogue land data. Indeed, it could have formed the most important basic source of data as it is readily available and could have been cheaper to render into computerized

datasets. However there is uncertainty as regards the quality of the available data as a result of some of defects enunciated by Ono and Igbokwe (2006). Digitizing them will imply digitizing and accumulating the imperfections and inconsistencies of the past, it will be an exercise that would introduce more complex problems and confusions for the system. But if we take care in handling the situation, by sifting tolerable sets after adjustment of errors and rectification of other defects otherwise the bad situation would become compounded.

d. The Land Use Act.

The Land Use Act of 1978, vested all lands in the country in the control of the government and empowering State Governors and Chairmen of Local Government Areas to grant statutory and customary rights of occupancy respectively, But, our investigations show that people still exercise individual ownership titles over land and land speculation is rampant every where. The same government accepts back-dated documents of recent land transactions and issues appropriate Certificates of Occupancy. This attitude further weakens the Act.

Again, the Act, in section 36 (3) and (4) stipulates the use of "a sketch" or "any other sufficient description of the land in general" for use in describing any land not in an urban area. This particular provision undermined the importance of accurate survey plans for representation of property boundaries, location, size and other datasets including geodetic framework, without which digital data-sharing cannot be established. Ironically, the bulk of country's land and population are located in the rural areas.

e. Survey laws and Regulations

There have been appeals for surveyors to embrace emerging new technologies in the land data acquisition and representations but the anathema is that our existing survey laws and regulations have not changed. So, it is even illegal to use the digital equipment in our various survey works. We join Ono and Igbokwe (2006), Adeyemi (2005) and Ndukwe (2001) to further stress the need for the existing survey laws and regulations to be reviewed in order to accommodate the emerging digital technologies in our land information databank.

f. Lack of Awareness and Poor Maintenance Culture

The surveyors still suffer lack of awareness of the profession and its products by even government and members of the public. People, especially, stake holders, have to be convinced on the wastages of the significant duplication of efforts in producing parallel sets of land data and maps and then, the ease of producing more efficient systems with the new available technology. Further, they need to be schooled on the need to appreciate the eventual advantages of the digital data-sharing i.e. accuracy, cost-effectiveness, high reliability, promptness of production and delivery which actually outweigh the initial capital investment demand. (See Fig.2)
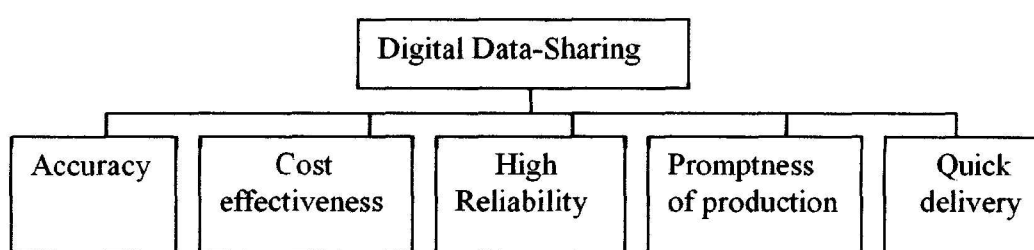

Fig. 2 Advantages of Data-sharing

Poor maintenance culture which lives with us, is the bane of digital data-sharing and dissemination in the land information databank. The nature of networking through intricate linkages and the operational mechanisms of the computer systems, which form the core hardware of data-sharing, demand high technological skills to operate for uninterrupted services. Therefore, these make regular plant and equipment maintenance imperative.

Discussions, Conclusions and Recommendations

The main handicap of integration and sharing of computerized geo databanks is the lack of coordination. A national coordinating body has been advocated by Kufoniyi (2002) which should be vested with the statutory/legal authority and power to discharge the function of harmonizing and regulating the operation of all geo data operators. The absence of coordination and control on national level have occasioned inter-operability and sharing problems (Onyeka, 2004). This is emanating from the following factors:

(i)   Non-regulation by common standard and metadata
(ii)   Non-adoption of mutually transformable geodetic frameworks or control systems
(iii) Diverse data formats, quality and accuracy levels
(iv)   Inability to move with deployment of equipment/instruments with multi- ranges of precision and configuration.
(v)   Lack of protection of privacy rights and interest of producers and users, and principally non-provision of legal framework for the production, management, distribution and use of geospatial datasets. But, the proposed National Spatial Data Infrastructure policy (NSDI) will take care of this when fully operational.
(vi)   Non-promotion of awareness of the existence and identification of the data sets and their applications.
(vii) Unguaranteed transparency and accountability among operators, etc.

These factors militate against data-sharing and that is why the currently existing land data in the computerized databanks of the few operating states government agencies and private organizations like the Shell Petroleum Development Company of Nigeria, Ltd are only for their private uses and cannot be shared easily and efficiently.

In conclusion, therefore, the problems of digital data-sharing have been identified and the bulk of the problems are inherent in the system itself. Land data are being held in various forms and by various agencies and departments. They are quite unknown among themselves. It was found out that it was not initially planned for mutual sharing. A nation that neglects the application of accurate, comprehensive, reliable, geospatial data in its administrative, social and economic planning and decision-making cannot:

●   develop and manage her natural resources
●   maintain and sustain her environment
●   be capable of sustaining a life support vision and consistent long-term! development plan.

Also, caution should be applied not to allow any of the above-identified obstacles to stifle the project. Unnecessary politicking over this crucial national developmental resource should give way to sound reason. It is further being recommended that the selection of equipment/instrument and their accessories, made by the coordinating body be based on the principle of the most "economically viable application of best available technology."

This will ensure application of uniformity and harmony in equipment and operations among participating agencies.

We therefore recommend for:

(a) Shrewd and honest feasibility studies should precede and guide the project.

(b) Establishment of accurate geodetic framework.

(c) Expert cost-benefit analysis should be explicit, clear and emphatic on the long-term benefits.

(d) Wealth-generating potentials and prospects of the scheme should be explanatory enough to convince the politicians, who hold the jurisdiction to authorize the establishment and,

(e) Adequate funding of the data-sharing in the land information databanks.

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