PARTNERSHIP IN IRRIGATION SYSTEM FOR INCREASED EFFICIENCY AND AGRICULTURAL PRODUCTIVITY IN NIGERIA

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ABSTRACT

This study critically examines the prospects of large irrigation scheme in achieving the goals of the Public Private Partnership initiative in its role of achieving increased project efficiency and productivity in our society. The Omi dam irrigation scheme under the Lower Niger Development Authority, Ilorin was examined and analyzed to determine its prospect in achieving the set objectives of increased food production. Direct field observation of this large irrigation scheme was carried out and relevant data on irrigation infrastructures that facilitate crop production were harvested. The nature of the data collected requires just simple descriptive statistics. The Scheme was found to have capacity for expansion and prospect for increased production but cannot achieve the desired target because the government finds it difficult to allocate enough funds due to overall fiscal constraint and inability to operate a regular maintenance of infrastructure. This implies that a better operational and maintenance strategy is required. The study therefore seeks for a partnership relationship among stakeholders in irrigation agriculture for efficiency of the project and increased production. It therefore recommends that government at local, state and federal levels should create enabling environment and be committed to the Public Private Partnership initiative implementation. This will make the system to be more efficient and pivot increased productivity of the farmers and the system as a whole.

Key Words: Irrigation, Partnership, Efficiency, Productivity, Constraint

INTRODUCTION

The huge cost of provision and maintenance of large scale irrigation projects in Nigeria has made many of them moribund or completely abandoned in some cases. This led to the Federal government’s decision on privatization and commercialization of River Basin Development Authorities in late 80s. The government deemed this necessary because it could not finance and sustain the schemes any longer as it also found it difficult to recover some cost of operations in the large scale irrigation schemes which government sunk huge sum of money. For example, in the 3rd and 4th development plans, the Federal government spent N778.1 million and N2.094 billion respectively on River Basin Development Authorities (R.B.D.As) alone. One would ask should such projects be abandon or just waste away like that? For more than two decades most of these projects have not achieved the set objectives. In fact, it has been observed that large scale surface irrigation schemes are on decline in most nations of the world. For example in South East Asia, many of the most large to medium scale public irrigation schemes are performing below their potential due to inappropriate design and lack of proper operation and maintenance. There is no doubt that a holistic framework has to be put in place for the maintenance and management of irrigation schemes such that efficiency and effectiveness of such projects can be enhanced. Therefore, a new paradigm for public and private intervention is required for the system. This paper tries to examine one of the large scale irrigation projects of the Lower Niger River Basin Development Authority (L.N.R.B.D.A) Ilorin as an epitome of large irrigation schemes of River Basins Authorities in Nigeria, with a view to justify adoption of the Public Private Partnership (PPP) initiative for their operations and management for better efficiency and productivity.
Public private partnership

Governments of nations have faced the challenges of managing large complex capital infrastructure projects. They often find it difficult to meet the people’s insatiable demand of quality infrastructure and services because of inadequate funds from budgetary allocations. So many things to be done or provided with limited revenue. Whereas a continued growth rate of an economy rest on the provision of a quality infrastructure, hence the engagement of private sector innovation and expertise for building where possible and deliver savings that will help in filling the infrastructure gap. In other words, Public Private Partnership (PPP) is now seen as a way out for harnessing private sector investment and operational efficiencies in provision of public assets and services.

PPP evolved as a result of government’s commitment to improving the level and quality of economic and social infrastructural services delivery across a nation. For example, in the United State of America, less involvement of government in the public sector service delivery informed the evolution of PPP. It is seen as a contractual relationship between the public and private sectors that brings together the strength of both parties to provide services or infrastructures in a cost effective manner. PPP financing has been a source of vital infrastructure investment without necessarily increasing governmental or quasi-governmental debt levels. At the same time, the private sector offers managerial or operational expertise and efficiency, leading to better quality and perhaps a lower cost. For the private sector, PPPs present business opportunities in areas from which the private sector was previously excluded.

In Canada, PPP is defined as a cooperative venture between the public and private sector, built on the expertise of each partner, that best meet, clearly defined public needs through the appropriate allocation of resources, risks and rewards. PPPs are currently operating across the country in bridges and roads to hospitals and prisons. Users and the people are reaping the benefits with better services, lower costs and faster delivery time.

India government described PPP as a private business investment where two parties comprising government as well as a private sector undertaking form a partnership. The Indian government observed shortages in highways, ports, airports, railways and power and attract private investments through PPP initiatives for her sustainable development programs and projects through infrastructure and services delivery. The PPP supplements scarce public resources. Today, India has emerged as one of the leading PPP markets in the world. Government of India set up Public Private Partnership Appraisal Committee to streamline appraisal and approval of projects. Transparent and competitive bidding processes have been established. To provide a broader crosssectoral fillip to PPPs, extensive support has been extended through project development funds, viability gap funding, user charge reforms, provision of long tenor financing and refinancing as well as institutional and individual capacity building. The government of India is committed to continue creation of enabling environment for PPPs across the country, through initiatives including enabling funds and schemes, guidelines, institutional structures as well as processes.

It can be observed that PPP initiatives in the countries briefly described above are functional, better organized and their infrastructure provision and service delivery are timely and efficient in most cases. The users of the projects and the community are reaping the benefits and infrastructure efficiency is at the optimum. Productivity in these countries is high and services delivery is efficient.

Nigeria Environment

Nigeria is located in West Africa bounded in the west by Republic of Benne, in the east by Cameroon Republic, Niger and Chad Republic is to its north and the atlantic ocean bounds the south. It is extends between about latitude 4° N and 14° N of the Equator and 2° E and 14°E of the Greenwich. The land area is 910,768 sq. km with varied landscape. The south has the tropical rainforest; in the central part is the Savannah with grasses and flowers between trees and Sahel vegetation in the north with desert encroaching fast into the country (Fig 1). Thirty three percent of its land is classified as arable land, while 3.14 percent is on permanent crops, only 2,930 sq. km
is irrigated. The climatic condition has not permitted full utilization of the vast land for agriculture because of the high degree of spatial and temporal variation in the amount and distribution of rainfall. The south has an annual rainfall ranging between 1,524mm and 2,035mm and concentrated within 8 – 10 months (equatorial climate). The middle belt has between 508mm and 1,524mm annually and in the north it is less than 508mm annually and it falls for a period of 5-6months (tropical climate) and less 4 months especially in the far north (arid climate).

Nigeria is the most populous country in Africa, the recent population census released in 2006 gave the population of 140,003,542, the United Nations estimate in 2009 was 154,729,000 and Center for Intelligence Agency reported 155,215,573 as at July 2010.

The implication of this explosive population growth is that the nation has an increasing teeming population to feed and care for. Around 52 percent of Nigerians live in poverty and 70 percent are living below poverty, it is therefore necessary to work out strategies that will make agriculture more productive and this can be done through effective and responsive irrigation practice more so when agriculture is the main occupation of the people. It employs not less than two-thirds of the population as more than 70 percent of the people live in rural areas. Agriculture contributes 42.2 percent to the total GDP in 2007.

Irrigation design and operations in Nigeria

Larger part of Nigerian environment falls within an area where water is inadequate for agricultural practices. Therefore, irrigation is necessary even in areas where rainfall amount seems to be adequate but its distribution varies. Irrigation has been viewed as a deliberate supply of stored water in a controlled manner, in order to supplement rain or groundwater to sustain or improve crop production. Irrigation has also been defined as the application of water to the land for the purpose of supplying moisture essential for plant growth. Irrigation has again been observed a dry condition due to evaporative demand of the atmosphere which continuously creates stress for plants and therefore requires water supplements for the period.

Common to the expressions among very many others is the involvement of artificial or conscious effort to augment soil water supply during a period of deficit or in areas of deficit. Irrigation projects are therefore designed to help reduce the
dependence of crop growth on precipitation, which to a large extent is uncontrollable by man. This implies that irrigation is to meet additional requirement of crops during the wet season and supplies water to farmland during dry periods. In Historical perspectives of irrigated Agriculture in Africa it was reported that there have been engineering as well as organizational failures of big irrigation schemes. The sophistication of technology increased while an improvement in the management level lags behind. Consequently, there is a big gap between the level of technology and the level of management. This prevailing conditions coupled with pilling-up debts has forced governments in developing countries particularly Nigeria to re-organize River Basins and change their mandate. The implementation of the policies by changing the mandate of the R.B.D.As, to just water provision and removal of agricultural production and extension services, made the schemes to be unattractive to farmers any longer. Furthermore, commercialization and privatization policy has over turned the initial conception of irrigation as ‘Social Service’ and transformed it into Commercial Enterprise and the inconsistencies in the policies of the government are inhibiting the efficiency and effectiveness of irrigation project particularly in the South Western Nigeria. Low level farmers organization (Cooperative Societies and Water Users Association) are found in some irrigation projects under Niger River Basin Authority. Such organizations become very relevant under deregulated economy. Prior to this time such organizations exist in name and their role is not well defined. The importance of human factor in irrigation projects, the desired and abilities of the people were not recognized, despite the central position of the people as the expected beneficiaries of irrigation projects. The privatization and commercialization called for Joint-Management of irrigation projects. The policy called for the transfer of increased responsibilities for operation and maintenance of irrigation system to users. Therefore, the self-organizing propensity of the farmers must not only be acknowledged but must be enhanced. When the people are properly organized, recognized, mobilized and fully incorporated into the project they will become very effective in irrigation project management and its improvement. Under this prevailing condition, farmer’s effective participation is crucial to the management and sustenance of these gigantic irrigation projects. In fact, the attitude and power of the irrigation management need a re-orientation. It is necessary to establish a partnership between the public and irrigation agency.

**METHODOLOGY**

**Description of the project.**

The Omi Dam irrigation project of the LNRBDA, Ilorin otherwise known as Kampe irrigation project was purposively selected for this investigation as epitome of large scale irrigation schemes of river basin development authorities in Nigeria (Fig 2). It occupies a 4,100 ha expanse of irrigable land. The project has a Dam with impounding capacity of 250mill. Cubic meters of water, with 39 kilometer length main canal, about 300 kilometers of feeder and supplementary drainage system. The main canal is 29km and about 1000ha of irrigation land is available for effective and intensive irrigation activities. Omi dam irrigation scheme is located around Omi river catchment area in Yagba East Local Government Area of Kogi state. Apart from being one of the completed and commissioned project of the Lower Niger Basin Development Authority, its geographical location also made it appropriate for this study. Omi dam project falls in the derived savanna ecological zone of Kogi State with about 7 months of dry season. The dam site is 1642 km² and the dam itself has a 250m long spillway structure. It has a trapezoidal main canal covering a distance of 39 km. While the maximum height is 43m, the crest length is 1976m impounding 250 million cubic meters. A 9 cell bridge and 5 No culvert provide access to the project site and the village. The implementation of the project formed part of the intervention initiated by the federal government in the 80s to make a desirable impact on the objective of increasing the national food production. The main agricultural produce under the scheme include maize, sorghum, cassava and assorted vegetables.
Fig. 2: Irrigation project site for Lower Niger River Basin
Source: Lower Niger River Basin Development Authority.

Fig. 3: The General Layout, Source: NIKO
Data collection
The data used in this study were derived through field observation of this large irrigation scheme of the Lower Niger River Basin Development Authority, Ilorin. Relevant data on basic infrastructure such as irrigable land, irrigation equipments, fund for operation and participating farmers were obtained from both published and unpublished documents including Technical Reports of the basin authority. In order to supplement the data harvested the project officer was also interviewed on the operations and various activities of the Basin Authority in general. The nature of the data required and collected for this investigation does not need rigorous statistical analysis rather, simple descriptive analysis; proportion and percentages were employed in analyzing and presenting the results.

RESULTS AND DISCUSSION
The results presented in (Table 1) show that water is abundant for irrigation activities in the project area under investigation. The scheme impounds 220mill cubic meter of water. 190.8mill m$^3$ may be utilized but the project actually utilized 61.20mill m$^3$ and the ecological downstream user are about 60mill m$^3$. It is evidently clear that the dam has sufficient total water available with annual water balance of 5mill m$^3$.

The available irrigable land at the project site is 4,100ha and just 24.39 percent is currently irrigated while 3,100ha is not being utilized. The participating farmers do not have strong economic capacity that can effectively maintain the project efficiently. They can only cultivate small farm holds, the average farm size is less than 1ha at the project (Table 2). This is because of insufficient fund and non-availability or inadequacy of some irrigation equipments at the project site as shown in tables 3 and 4 below. During the period, less than fifty percent of the fund required is often released every farming season (Table 3).

Table 1: Available land and water for irrigation

<table>
<thead>
<tr>
<th>Irrigable land area</th>
<th>4,100ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated land</td>
<td>1000ha</td>
</tr>
<tr>
<td>% Irrigated</td>
<td>24.39</td>
</tr>
<tr>
<td>Dam capacity</td>
<td>250 million m$^3$</td>
</tr>
<tr>
<td>Volume impounded</td>
<td>220 million m$^3$</td>
</tr>
</tbody>
</table>


Fig 3: Shows the wide gap between available land for irrigation and the percentage cultivated in the five years under study.

<table>
<thead>
<tr>
<th>Seasons</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/2006</td>
<td>20</td>
</tr>
<tr>
<td>2006/2007</td>
<td>60</td>
</tr>
<tr>
<td>2007/2008</td>
<td>80</td>
</tr>
<tr>
<td>2008/2009</td>
<td>100</td>
</tr>
<tr>
<td>2009/2010</td>
<td>120</td>
</tr>
</tbody>
</table>

Legend:
- Irrigated Land
- % Utilized
Fund released is grossly inadequate for the operations hence poor efficiency and productivity of the scheme. In fact, fund released never exceeded 50 percent of the fund required (Fig. 4).

### Table 2: Land irrigated and farmers participation (2005-2010)

<table>
<thead>
<tr>
<th>Farming Season</th>
<th>Land area irrigated (in Ha.)</th>
<th>No. of participating farmers</th>
<th>% of land cultivated</th>
<th>Average ha / farmer</th>
<th>Expected average ha / Farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/2010</td>
<td>92</td>
<td>460</td>
<td>9.2</td>
<td>0.20</td>
<td>2.17</td>
</tr>
<tr>
<td>2008/2009</td>
<td>100</td>
<td>630</td>
<td>10.0</td>
<td>0.59</td>
<td>1.59</td>
</tr>
<tr>
<td>2007/2008</td>
<td>94</td>
<td>510</td>
<td>9.4</td>
<td>0.18</td>
<td>1.96</td>
</tr>
<tr>
<td>2006/2007</td>
<td>105</td>
<td>710</td>
<td>10.5</td>
<td>0.15</td>
<td>1.41</td>
</tr>
<tr>
<td>2005/2006</td>
<td>70</td>
<td>440</td>
<td>7.0</td>
<td>0.16</td>
<td>2.27</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2010

### Table 3: Funding Omi dam irrigation scheme (2005-2010)

<table>
<thead>
<tr>
<th>Farming Season</th>
<th>Land area irrigated (in ha.)</th>
<th>Fund required</th>
<th>Fund released</th>
<th>% of fund released</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/2010</td>
<td>92</td>
<td>#500,000</td>
<td>#231,000</td>
<td>46.20</td>
</tr>
<tr>
<td>2008/2009</td>
<td>100</td>
<td>#630,000</td>
<td>#250,000</td>
<td>39.68</td>
</tr>
<tr>
<td>2007/2008</td>
<td>94</td>
<td>#550,000</td>
<td>#210,000</td>
<td>38.18</td>
</tr>
<tr>
<td>2006/2007</td>
<td>105</td>
<td>#600,000</td>
<td>#260,000</td>
<td>43.33</td>
</tr>
<tr>
<td>2005/2006</td>
<td>70</td>
<td>#520,000</td>
<td>#270,000</td>
<td>51.92</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2010

Fig. 4: Proportion of Fund Released for Omi Dam Irrigation Scheme
Table 4 presents the state of the basic irrigation equipment required at Omi dam irrigation project site. The interaction with the project officer revealed that equipment for logistics are not available, planter and crop maintenance are nonexistence at the scheme. All bored down to inadequate funding of the project by the government.

**Table 4 : State of irrigation equipment at Omi irrigation project site**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>No</th>
<th>Condition</th>
<th>Remark</th>
<th>Equipment</th>
<th>Condition</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractors</td>
<td>6</td>
<td>Good</td>
<td>Not Adequate</td>
<td>Planter</td>
<td>None</td>
<td>Not available</td>
</tr>
<tr>
<td>Excavators</td>
<td>1</td>
<td>Good</td>
<td>Not Adequate</td>
<td>Boom Sprayer</td>
<td>None</td>
<td>Not available</td>
</tr>
<tr>
<td>Load loader</td>
<td>1</td>
<td>Good</td>
<td>Not Adequate</td>
<td>Duty Vehicle</td>
<td>None</td>
<td>Not available</td>
</tr>
<tr>
<td>Pale loader</td>
<td>1</td>
<td>Good</td>
<td>Not adequate</td>
<td>Motorcycle</td>
<td>None</td>
<td>Not available</td>
</tr>
<tr>
<td>Grader</td>
<td>1</td>
<td>Good</td>
<td>Not Adequate</td>
<td>Irrigation Pump</td>
<td>None</td>
<td>Not available</td>
</tr>
<tr>
<td>Bulldozer</td>
<td>1</td>
<td>Good</td>
<td>Not adequate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source : Field Survey, 2010

The scenario above is not peculiar to Nigeria, most countries in Africa and Asia in general also found themselves in this situation, hence the adoption of new strategies: users participation and management transfer: restructuring public sector Agencies: a new paradigm for public and private interaction in irrigation sector.\(^{25}\)

**Partnership relationship in irrigation system**

Over the last 50yrs, irrigated agriculture has been vital to meeting fast rising food demand and has been key to poverty reduction. However, irrigation agriculture has been faced with fiscal burden. Investment to develop irrigation infrastructure and services has been based on public funding. However, it has been observed that new paradigm place emphasis on private investor and restricts government or its agency’s role to monitoring.\(^{26, 27}\)

The large scale irrigation system is one in which Public Private Partnership is very relevant because its capital outlay is enormous hence, the management is public. Examples are found in South and East Asia. Public Private Partnership according to is seen as a contract between a public client and private supplier called operator or service provider. PPP has been found to be successful in water supply and sanitation. It has been able to mobilize private financing in concession and build operate and transfer (BOT).

In Brazil it was discovered that the public irrigation projects are not self sustainable, public irrigation generally tended to progress slowly and fall short of performance expectation.\(^{28}\) This made the government to transfer the beautiful experience of the PPP investment in infrastructure and provision of services to irrigation system.

Irrigation system has three basic functional parts; the government, the natural resource (water and land) /infrastructure and the farming community. The government in most cases provides the fund and infrastructures and other inputs, the people and farming community uses the provided infrastructures for farming activities and the natural resources of land and water are natural endowment which the farming community interact with for desired output. Since the economic base of the participating farmers is weak and the government is finding it difficult to fund the projects, Private sector funding would be required for irrigation infrastructure development, operation of service centers, vehicles and equipment. In fact, the effort of the government at reducing interest on Banks’ loan on agriculture to 2 percent and bank reforms are welcome developments because the banks will be strong enough to be a good source of fund that can be accessed by private organization that will partner with other stakeholders in River Basin System. The Federal government would be responsible for oversight and quality assessment, setting standards and monitoring to ensure these are met. The private sector would build the head
works, irrigation farms, service centers, and provide machinery and equipment as well as operation and maintenance of the scheme. The expected role of LNRBDA would be to monitor the project and ensuring good relationship between the large and small-scale farmers. It would also act as facilitator in providing an interface between the private investors and the communities. The participating farmers will have better access to the necessary infrastructure and other inputs which otherwise either has been lacking or inadequate for their farming activities.

The prompt and adequate supply of all the basic infrastructure and inputs will bring efficiency of the system, make the system productive and enhance agricultural productivity at the desired rate expected of irrigation system of such capacity. This has been the experience in many countries where PPP has been adopted

CONCLUSION

Nigeria population with high growth rate that may reach 289,083 by 2050 requires a technology that can transform agriculture and increase food production rapidly to meet the food demand of the people and generate employment and reduce poverty among the people. Modern irrigation technology has all it takes to mitigate against harsh weather causing food crisis in the country if it is properly developed and managed. Discussion on PPP in irrigation has it that PPP can bring many benefits starting from improved planning and design, operations, maintenance and management of the system. It solves the problem of poor maintenance, and unreliable services inherent in government provided irrigation.

The evidences from the study suggest full implementation of public private partnership initiatives for all large irrigation projects in the country because the state at which they are presently cannot produce enough food for the growing population. Full implementation of the initiate will have a strong impact on the livelihood of the people in and around the projects as it generate employment and income opportunities for the households on the farm and in the immediate communities.

REFERENCES


