VOLTA DAM: AN EXAMPLE OF INTERNATIONAL COOPERATION

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INTRODUCTION

Industrialization

Industrialization brings in its wake inventiveness, a modern outlook, and the environment for rapid technological progress. These factors make industrialization desirable. Indeed, industrialization is the main hope of most developing nations which are trying to increase their levels of income. It is also the most controversial aspect of the problem of economic development. In most cases, there remains a wide margin of disagreement between advocates of international specialization and investment in primary production on the one hand, and the proponents of “balanced growth” and industrialization on the other.¹

Moreover, the achievement of industrialization is not an easy task for the governments of developing nations. In a developing country, agriculture or extractive industries will usually account for a large fraction of total production. Often there is at one extreme, a large group of virtually self-sufficient farmers and at the other, a section of the economy which is heavily dependent on the export of a few crops, forest products, and minerals.

The export industries and their complementary activities are subject to the impact of wide economic fluctuations in the outside world. Subsistence farmers may participate only indirectly in these fluctuations.² Usually the governmental budget of a developing nation will represent a larger share of national


income than it did in industrialized countries at a comparable stage of development. This is the result of public investment programs, modern ideas about the welfare state, and military expenditures.

Political and Socio-Economic Situation in Ghana Today

To give a concrete example, in 1957, the Gold Coast, an old British colony, was the first West African territory to acquire independence since Liberia had achieved that status more than a century earlier. The Gold Coast was then renamed Ghana.

Ghana, with a population of about 8 million, is the second most populous state in West Africa. With a per capita income of $169, it is the wealthiest nation in its area of Africa. At the same time, with an area of 91,843 square miles, Ghana is one of the smallest countries in Africa. Three-quarters of the population live within half a day’s motor journey of Accra, the capital.

As a whole, the population of Ghana is relatively well educated. Indeed, Ghana has one of the highest adult literacy rates in Africa.3

Most land in Ghana is used either for subsistence farming or cocoa production. Disease and water shortages reduce the usefulness of the land for large-scale cattle grazing. A considerable amount of land, particularly in the northern territories and coastal plans, remains unused much of the year because of alternating periods of drought and flood.4

From an economic point of view, the problems of Ghana are similar to those of other underdeveloped countries of the world. As Professor S. H. Frankel puts it: “The real problem confronting the ‘underdeveloped’ countries of the world is not only how to economize in the use of foreign capital, but how to utilize all capital to achieve new goals of social action with the least amount of unnecessary social disintegration and disharmony.”5

Kwame Nkrumah, who ruled Ghana from 1951 to 1966, faced the three most crucial economic problems of emerging

nations - agricultural reform, extension of education, and the creation of industries which draw heavily on labor. In industry, the Volta Project started construction in 1962 to produce electricity for industrialization and for consumer needs.6

In brief, the basis of Ghana’s economy in the past has been the cultivation and export of a single crop - cocoa. Today Ghana hopes to escape from the exclusive reliance on cocoa by exploiting its great natural resource, the Volta River.

Ghana is now ruled by the National Liberation Council, which is composed of high military men who took power on February 24, 1966 by a military coup against the Nkrumah regime.

*The Volta River Project: Power From Water*

The effect of gravity on water constitutes one of the world’s greatest motive forces. Man’s aim therefore is so to control the flow of water that it produces the greatest possible force at a given point. Consequently, where a river passes through a valley and it is possible, through the use of modern construction methods, to build a wall or a dam across the height of that valley and block the flow of the river so that the water rises gradually until it falls in a cascade over the top of the dam. Then it may be said that, at the point where the water strikes the river bed after cascading over the dam, the maximum striking power possible has been secured from the river.

If, instead of allowing the water to fall freely over the dam, the same water is channeled into great pipes so that, on reaching the level of the river bed, it strikes huge water wheels, purposely placed there, those wheels will revolve at a terrific pace and through one of the marvels of science, will, if they are joined by driving shafts to specially wired generators, produce vast quantities of electric current which may then be carried across country by overhead wires to wherever the current is required for industrial or domestic purposes.

Fortunately for Ghana, at Akosombo in the Volta River valley, some 80 miles from the mouth of the river at Ada, there is just such a place where modern dam designers had been able to plan a dam some 370 feet high and 2,100 feet long, and with it

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an electric power house capable of generating on its own more than 20 times all the electric power that is generated by the Electricity Department in Ghana.7

Now, let us turn to the story of this huge project, which could well provide the springboard to a miniature industrial revolution in Ghana.

HISTORICAL BACKGROUND

The history of the Volta River Project can be divided into four phases:

1. From 1914, when substantial reserves of bauxite were discovered, and hydroelectric development was first considered, to 1952, when the British and the Gold Coast Governments began to show serious interest in the project;

2. From 1953 to 1956, when detailed investigation was made into the original scheme and the subsequent failure to bring it to life;

3. The critical political phase, from 1957 to the end of 1961, which led to government’s decision to go ahead with a modified project;

4. The construction phase, which started in 1962, and its ultimate completion, of which Ghana is now reaping the fruits.

Let us now discuss these phases briefly.

The Discovery of Bauxite in Ghana

The potentialities of Ghana’s Volta River for the generating of immense quantities of hydro-electric power have been known for half a century. The history of the scheme began with the discovery of substantial reserves of bauxite in the Gold Coast in 1914. The total quantity of bauxite reserves is now estimated to be about some 225 million tons.8 In 1915, the very site now selected for the dam at Akosombo was noted in a geological survey as being suitable for this purpose.

7 Economist (London), August 27, 1960, p. 85
Both before and after World War II, considerable technical investigation into the feasibility of such a project and its usefulness for processing natural bauxite into aluminium was carried out by a privately formed company and the findings were carefully examined and assessed by the government of the Gold Coast.

In 1951, when Dr. Nkrumah's newly formed government, of which he was the first Prime Minister, assumed office, it lost no time in fulfilling its election promise that, in order to try to balance the agricultural economy of the country with a developing industrial economy, the possibility of harnessing the power of the Volta would be immediately examined, and with it the further possibility of using power for large scale aluminum smelting. 9

_The Establishment of the Volta River Project - Preparatory Commission and British Partnership_

Following preliminary discussions, the Volta River Project Preparatory Commission was established in 1953 and, three years later, after the most exhaustive examination of all the problems involved, reported that the Project as envisaged was technically sound and economically feasible. (1956).

The basis for financing the project was a form of partnership between the Gold Coast Government, the United Kingdom Government, and two aluminum companies. Allowing for possible inflation, an overall cost of $868,000,000 was estimated. But financial negotiations between the two governments brought no results. 10

_U. S. Involvement in the Project_

In July 1958, Dr. Nkrumah took the opportunity of an official visit to the United States discuss the project with President Dwight D. Eisenhower, and this led to the appointment of the Henry J. Kaiser Company to conduct an engineering re-appraisal of the project, the cost of which was to be shared between the two governments, the United States and Ghana.

In February 1959 the Kaiser company submitted its report. The report recommended changing the site of the main dam from

10 _Time_, May, 4, 1959.
Ajenia (selected by the Preparatory Commission) to Akosombo (1.5 miles downstream).  

These proposals in the Reassessment Report were found to be basically acceptable to the government of Ghana and planning of the Volta River Project has proceeded on this basis since that time.

THE CONSTRUCTION OF THE DAM

Technical Aspect

1. The Volta River

The Volta, whose name in Portuguese means "wander", rises in the Republic of Upper Volta (a former French Colony on Ghana's northern border). It flows 1,000 miles to the Gulf of Guinea at a rate of 500 cubic feet per second at low water in the dry season. However, at flood, after the rainy season, this flow jumps to 500,000 cubic feet per second.

2. Volta River Development Projects

The hydroelectric project backs up the river water to form a reservoir which covers about four percent of the country's area.

The Volta River Development involves two projects:

a. Dam and power station, at Akosombo

b. Aluminum smelter at Tema

The Akosombo Dam and the Volta Aluminum Company (VALCO) smelter at Tema spell progress and future prosperity for Ghana. The two projects are interdependent, for on the one hand, without power from the Dam, the smelter cannot operate, and on the other, a large power consumer like the VOLCO smelter is needed to help in financing the Dam. It is in this way that the VOLCO smelter and the Akosombo Dam are related.

The smelter is the main customer of the Volta River Authority which operated the hydroelectric plant at Akosombo.

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With the installation of the first four generators at Akosombo, the Dam Will generate 512,000 kilowatts of electric power. In November 1967, VALCO Aluminum’s smelter consumed 200,000 kilowatts; this amount will be increased to 300,000 kilowatts at a later stage when the plan is fully developed.14

Upon its completion, the smelter situated on a 250-acre site, will be the second largest in operation outside of North America, and one of the ten largest in the world.

a. Features of the Dam and Power Station

The main dam, with a crest length of 2,200 feet and a maximum height of 290 feet, is of rockfill type, with a central clay core with approximately 10.9 million cubic yards of material used in its construction. An auxiliary rockfill saddle dam 1,100 feet long and 120 feet high has been constructed east of the main dam to close a gap in the surrounding hills.15

The Volta Dam at Akosombo was completed ahead of schedule in February 1965, and electrical power is already flowing from the power station to various parts of the country. When the project is finally completed, Ghana’s electrical capacity will be increased by nearly 500 percent.

b. Features of the Volta Lake

Above the dam, the lake, which forms as the water rises, has been the largest man-made lake in the world, covering an area of approximately 3,275 square miles, and being, as its longest point, some 250 miles in length.

About 70,000 people in this area were happily resettled in new communities on higher ground. Nkrumah had, in fact, promised that, as a result of the project, “no one will be worse off.”16

Political Aspect

1. Domestic Politics - Legislative Action

a. Reactions to Foreign Capital

When Nkrumah decided to discuss the Volta River Project with foreign governments and private companies, the scheme

aroused a great deal of controversy in domestic politics. Bedrako Poku, who later became General Secretary of the Convention People's Party (CPP), warned the government on February 23, 1953 that the dam might mean economic enslavement. Cecil Forde, editor of the *Ghanaian Times*, organized the Swedru branch of the People's Educational Association to protest publicly against it; de Graft Johnson, an extra-mural tutor in the University College at Accra, published articles trying to show that the scheme could and should be financed locally; the Ashanti Youth Association (AYA) protested to Nkrumah, asking him to suspend the scheme "in the name of the people of Ghana, the children yet unborn."  

b. The Creation of the Volta River Authority

In spite of the above reactions, on April 19, 1961, the Volta River Development Bill was presented to Parliament, passed through all its stages, and became law. The purpose of this Bill was to establish a Volta River Authority, an independent government corporation patterned after the TVA of the United States, charged with the duties of generating electricity from the water power of the Volta River by means of constructing a dam and power house at Akosombo and of dealing with all the development, commercial and administrative problems arising from the project, including the resettlement of those people whose homes would be affected by the creation lake which resulted from damming of the river.

The provisions of the Act may briefly be divided into four parts as follows:

1. The Volta River Authority has a chairman and seven other members. The President of the Republic has undertaken the task serving as chairman of the Authority. Of the members, two will represent the major consumers of electricity - VALCO, who are to own the smelter, and the Government's own Electricity Division which will retail electricity to other users - and a third will be the Authority's Chief Executive. A fourth may be an expert in finance. The Authority is required to

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train and employ Ghanaians so that eventually the Authority will become a fully Ghanaian organization.

2. The Authority is encouraged to develop the lake for fishing, transportation and the health and welfare of the peoples living near the lake.

3. The Authority is charged with financial and commercial responsibilities in order to ensure the efficient and economic operation of the project, and provision is made for the progressive repayment of the Government's own investment and other loans.

4. The Authority will carry out the Government's policy to assist the people concerned in building new villages and townships and finding new livelihood. Resettlement will be planned in stages, so that new areas are ready for occupation before the old ones have to be vacated. The Government's aim is that no one should, as a result of the Project, be worse off than before, and that the new conditions should be as good, if not better, than the old ones.¹⁸

On October 5, 1961, Nkrumah appointed John Dodson, a Canadian engineer, as Chief Executive of the Authority.¹⁹

2. International Scene

The Volta River Project has proved a controversial enterprise particularly in terms of its financing. In 1956, when Ghana was still a British colony and was called the Gold Coast, British engineers, under the chairmanship of Sir Robert Jackson, drew up a plan for a dam and smelter works costing about $900 million. This amount was more than Ghana could afford. For this reason, the Project had reached the stage of detailed discussions between the Ghanaian, British, and Canadian governments; and two private aluminum companies - 'Canada's Aluminum Ltd. (Alcan) and British Aluminum Ltd.'²⁰

Financial negotiations, however, between these governments and the two aluminum companies proved to be protract-
ted and difficult. The massive report on the Project was consequently shelved in London and Montreal in 1957.21

But in Accra, as independence day passed into history, the volume was fondled lovingly. The newly created government strongly supported the Volta scheme and made it a keystone of national policy. To build the dam, Nkrumah had to turn to the United States government and U. S. private industry—and this was an important step for a man who had often reviled U.S. foreign policy, and had accepted more than $40 million in U. S. S. R. aid. He had also said that “capitalism is too complicated a system for a newly independent nation.”22

As already mentioned to ensure the necessary U. S. aid for the Volta Dam project, Dr. Nkrumah met President Eisenhower in July 1958 and in September 1960. The first visit as we have seen, led to the appointment of the Kaiser Company. The second visit provided funds totaling $30 million from U. S. sources for financing of the Volta River Project. Also, in June 1961, the late President John F. Kennedy offered assurance of U. S. support in financing Ghana’s Volta River hydroelectric dam.

However, just two weeks before the final contracts were to be signed in Accra on October 5, the U. S. State Department decided “to take a final look at the whole thing before going ahead,” and said that the October 5 date could not be met. One guess as to why the U. S. wanted more time to consider the project was that the Administration had been disturbed by Nkrumah’s anti-Western statements at the neutralist conference held in Belgrade in September, 1961.

While the political atmosphere was thus becoming cloudy between the U. S. and Ghana, on September 25, 1961, the U.S.S.R. offered financial aid to Ghana.23 In letters, dated October 3 and 10, Nkrumah asked president Kennedy, if the U. S. would aid his project or not.

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21 Sickman, op. cit., p. 130.
22 Ibid.,
Finally, on October 20, 1961, President Kennedy named Cle-rance B. Randall to head a special mission to take a "final hard look" at the prospective U. S. aid to the project. At the end of October, Randall's mission returned to Washington from Ghana with its assessment of whether or not a $200,000,000 U. S. government loan to Ghana for the Volta River Project would prove a good investment.  

As a result, in spite of opposition of some senators in the Congress, on December 15, 1961, the United States government decided to lend Ghana $133,000,000 for construction of the huge project. This decision to aid Ghana meant that, instead of Soviet experts, hundreds of American and other Western technicians and engineers would be working and living in Ghana. Then at a ceremony, held on January 23, 1962, Dr. Nkrumah pressed a button and thus blasted a section out of a hill in Akosombo, formally starting the multi-million dollar Volta River Project, one of the most important of Africa's hydroelectric projects. The point where talking ended and work began had been reached at last.

Economic Aspect

1. Purpose of the Project

As Philip Sickman, an American writer, pointed out, "In the religion of the new nationalism, a dam is the grandest temple, promising miracles in industrial development and richer living. The TVA, probably more than any other American material achievement, has impressed and tantalized the emerging nations of Asia and Africa, stirring hopes of constructing similar monumental project on their own rivers."

The Volta River Project was proposed in order to irrigate the Accra Plains and to produce aluminum from the large bauxite reserves of Ghana, and to provide the hydroelectric power essential to that production - and urgently needed for the development of a subsidiary light industry. This proposed development should substantially increase Ghana's revenues, provide jobs, and fur-
her change the social organization of its peoples. Thus Ghana’s main energy potential lies in the Volta development scheme.

2. Financing the Project

The financing of the Project offers an excellent example of international cooperation. Of the estimated cost of $200 million, the Ghana government invested half the amount and the remaining half was provided by international loans. A summary of the various sources used to finance the project is as follows:

<table>
<thead>
<tr>
<th>Estimated cost</th>
<th>$196,000,000</th>
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</thead>
<tbody>
<tr>
<td><strong>SOURCES OF FUNDS</strong></td>
<td></td>
</tr>
<tr>
<td>Ghana</td>
<td>98,000,000</td>
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<tr>
<td>International Bank of</td>
<td>47,000,000</td>
</tr>
<tr>
<td>Reconstruction and Development (for 25 years)</td>
<td></td>
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<tr>
<td>Agency for International Development (AID), United States (For 30 years)</td>
<td>27,000,000</td>
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<tr>
<td>United Kingdom Government</td>
<td>14,000,000</td>
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<tr>
<td>(for 25 years)</td>
<td></td>
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<tr>
<td>Export-Import Bank of Washington</td>
<td>9,999,999</td>
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<tr>
<td>(for 25 years)</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>196,000,000</td>
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Contract for the Construction of the Dam

On September 21, 1960, the government of Ghana invited tenders for construction of the Volta River Dam, which was intended to open up prospects for the industrialization of Ghana. The plan modified by Kaiser engineers and constructing workers was put into effect. More than twenty contracting concerns, registered for the job, which was to cost up to about $196,000,000.

The construction task involved the implementation of plans to create a dam capable of producing a 3,500-square-mile lake, a huge powers house, and the resettlement of about 70,000 persons.

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28 *Ghana Reborn*, p. 59.
On February 22, 1961, to attract capital which Ghana needed for the project, existing laws were amended, and new laws were enacted to give the Volta Project special exemption from duties and taxes on imports and exports.30

Finally, the $45 million contract for the Akosombo Dam was awarded to an Italian consortium, IMPRESIT-GIORLALODIGIANI and E. RECCHI. Work started in September 1961, with dredging of sand from the river bed and work on access roads and of excavations.

At the peak of the construction, 5,000 Ghanaians were employed. In addition to these workers, the staff of engineers has included Italians, Americans, Canadians, Germans, Austrians, Japanese, and Pakistanis.31

**Opening of Ghana’s Hydro-Electric Volta Dam - Inauguration**

On Saturday, January 22, 1966, a galaxy of international personalities assembled at Akosombo, about 65 miles from Accra (Ghana’s capital) to witness the official inauguration of Ghana’s vast hydro-electric Volta Project. Many governments, including those of the United States, Canada and Britain which had been closely connected with the project, were represented at this historic ceremony by delegations.

Among distinguished American personalities invited were Mrs. Jacqueline Kennedy (wife of the late President Kennedy) and Mr. Edgar F. Kaiser. Mrs. Kennedy had been invited to unveil a plaque to commemorate the part played by her late husband and by former President Eisenhower in the Volta project.32

**A Symbol of International Cooperation**

In a speech at the inauguration of the Volta Project on January 22, 1966, President Nkrumah described the Project as “a concrete symbol of the type of international co-operation which can help to forge world peace.”

He also praised the U. S. government and private companies which contributed to the Project.33

31 Ibid., January 25, 1965, p. 55
BENEFITS OF THE PROJECT

Although the Volta Project is a hydro-electric scheme, it opens up possibilities of development in many other fields such as transportation, agriculture and fisheries. Among a whole range of benefits which can be derived from the Project, the following should be mentioned:

*Power for Industries and for the People*

The abundant supply of electrical power from the Volta project will attract new industries and stimulate the modernization of existing ones in the area covered by the network.

The amount of electricity which is expected to be generated by the Akosombo power station when the first phase of the construction has been completed (four out of a total of six generators) will be 512,000 kilowatts. Of this amount, the needs of VALCO's smelter at Tema will account for some 30,000 kilowatts, leaving somewhat over 200,000 kilowatts for distribution on the national grid to other consumer. In 1967, the VALCO smelter consumed 200,000 kilowatts of electricity.

*Benefits for Agriculture*

Agriculture will benefit in various ways. The world's largest artificial lake, formed by the waters of the Volta, will provide irrigation possibilities, as well as prospects for sugar and rice cultivation. Fisheries from the Lake are expected to produce from 20,000 to 25,000 tons of fish annually.

*Benefits for Employment*

The Volta Project will confer a number of direct benefits on the national economy by means of creating new possibilities of gainful employment for Ghanaian nationals in the construction and the operational stages. At the end of October 1963, nearly 3,000 Ghanaians and 400 expatriates were engaged in construction activities at the dam site at Akosombo. This number was about equal to the number of workers engaged in the resettlement program. And about 2,000 people are employed at the smelter plant alone.

34 *Ghana Reborn*, p. 58-60.
A training scheme has been established to develop the necessary skills for Ghanaians to operate the smelter and to replace the expatriates as quickly as possible.\(^{36}\)

**Foreign Trade**

On January 29, 1967, the Volta Aluminum Company (VALCO) had already started production. On March 12, 1967, the first Ghana-produced aluminum made its debut on the world market when VALCO shipped 250 tons of ingot from Tema Harbour. In September 1967 output had increased to 15,000 tons. When the three portions of power station were completed in November 1967 the smelter had a producing capacity of 103,000 tons, which will eventually be increased to 145,000 tons. Through the efforts of the Volta Aluminum Company, Ghana-made aluminum is now taking its place in world markets, alongside of Ghana’s cocoa, gold, and diamonds.\(^{37}\)

The availability of electric power will also result in a considerable saving in foreign exchange on imported fuel oil, which at present is the principal source of industrial power.

**Cheap Transportation**

Moreover, over and across the lake, will ply sailing and motorised vessels which will in many ways revolutionize the transport system of the country, for cheap water transport will extend from the south into the very North and may even tap new sources of mineral wealth such as the iron ore deposits in the North, which have, up to now, been too far from road or rail routes to be workable.

**Help for Tourism**

It is expected that even holiday makers will delight in the cool waters of the lake and the exciting new valleys, creeks and scenery which will be seen on every side. Favorite holiday centres will rapidly grow and many people will cross the world to see Lake Volta—the largest man-made lake in the world.

Therefore, it is hoped that the dam and lake will be a major tourist attraction, offering facilities for year round yachting, water skiing, camping and other activities.

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37 Ibid.
Effect on Health

Turning the Volta into a comparatively still lake instead of a fast-moving river, by means of the dam, will substantially reduce the incidence of the dread disease Onchocerciasis or "river blindness", whose vector, the simillium fly, proliferates in fast-moving waters.

Fields for Research

The Ghana Project ensured opportunities for research in several fields, such as fisheries, health, and resettlement. A Volta Lake Research Project was started in January 1968.

The purpose of this project, to last three years, is to strengthen research on fisheries and hydrobiology, public health, and resettlement of 80,000 people displaced by the 3,275 square miles Volta Lake. These are considered the most urgent of the needs for investigation concerning the development of the Volta Lake resources.

Three parties are involved in this project, the Ghana Government, the United Nations Development Programme (UNDP); and the Food and Agricultural Organisation (FAO).

In addition other international agencies will participate including UNESCO and WHO, with SHO assuming operating responsibilities under the Project Manager for aspects of the public health effort.38

CONCLUSION

The opening of the Volta hydroelectric power project at Akosombo on January 22, 1966 represented a significant landmark in Ghana’s industrial and economic development. First the economic justification of the Project—the production of electricity—has been achieved thereby increasing not only the industrial potential of Ghana, but also the benefits which accrue to the country’s agricultural development.

Second, Akosombo power project makes an important step in the lives of Ghana’s people, separating, in the words of Dr. Nkrumah, “the sluggish and stagnant colonial past” from “a

38 Ghana Today, December 27, 1967, p. 7
new era of industrial and economic dynamism and self-sufficiency."

Third, the project shows what can be achieved through international cooperation when sixteen nations, including Italian contractors, American consulting engineers (Kaiser Engineers and Constructors Incorporated of Oakland, California), manufacturers from Austria, Italy, Japan, the United Kingdom, Canada and the United States pool their resources for a noble purpose - to help raise the standard of living of a whole people.

The international character of the project is illustrated further by the distribution of the total cost of the Project. The Ghana government from its own resources, provided 50 per cent of the cost, in addition to investing in the new port and the industrial area of Tema. The remaining 50 per cent consisted of international loans made by the International Bank for Reconstruction and Development, the United States Government Agency for International Development, the United States Government Export-Import Back, and the United Kingdom Board of Trade.