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Seaport Building, Management and the Challenges of Sustainability

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ABSTRACT

Seaport remains the most feasible for the activities of terminals, international export and import business activities where loading and offloading of inter-land distribution through inland waterways, rail, road and air to ensure that what comes in or go out are checked to meet the national and international rules and regulation guiding seaport operations. As a source of major point of commercial activity along the coast. As a source of pollution, harbors need to be strategically located to provide the greatest benefit according to economic and environmental issues. The marine environment and its effects on ports design, port warehousing, port operation, port hydraulics, coastal geomorphology, littoral drift and sedimentation, port security and safety for shipping technology and economics activities, design and construction of a floating port related structure and other environmental issues. Seaport building must have the organizational capacities to appropriately perceive issues, analysis information about complex economic and environmental relationships factors of turbulent transition, increasing demand on ports to acquire, assimilate, highly fragmented information about new potential constraints and opportunities in port management and challenges of it sustainability. The geotechnical and Structural aspect of the port construction have been given very little attention. This research use an annotated conversation and questioner to address the above issues, with the aim to apply concepts of practice, port elements and their effects on seaports. This research use an annotated conversation and questioner to address the above issues, and their effects on seaports. This research have to investigate the needed professionals, in civil, structural , geotechnical, hydraulic engineers and consultants to strength the usage of modern materials, corrosion, naval-architecture and other input knowledges of which is required to produce a sound and commercial design of a modern standard seaport or marine terminal for sustainability.

Key word: Seaport, Building Project, Management and Challenges.

INTRODUCTION

Port construction and design consideration has been influenced by changes in water vehicles size, vessel and modern terminal operations, event of new technology that resulted in effect on both the design of port structures and lay-out of the terminals. To understand the

interactions between the environmental agents, such as waves, currents, and wind, the harbor soils, backfill materials with bottom – fixed marine structures. The usual multipurpose terminals that resulted in effects on both the design of building structures and sustainability of the port.

Maritime transportation has generally been the most convenient and least expensive means of transporting goods and this is why mankind since ancient times has been steadily extending its activities into this areas. The civil engineers design, build and maintain foundation of modern infrastructure of seaport and a host of socialites of economic investment and environment structures having impact on freight traffic focus, types of freights and problems associated with seaport activities like containerized cargoes, general cargoes, roll on –roll –off cargoes and also petroleum products, handling plants equipment turn around time private sector participation and operational efficiency at the seaport.

Marine structures for various port purpose have been developed using new design and construction principles and operation of these structure to improve new port constructions. Better tending system and efficient mooring accessories. New and better structural materials have been introduced e.g. Modern concrete technology now enables the engineer to use durable high- strength concrete which are highly resistant to deterioration in harsh marine environments.

For more water vehicles to berth and keep the rivers usable for mobility and more ship, more ports, piers has to be constructed along the river banks. (Chitkara, K. K. 2011) This was the beginning of the development of modern ports which lead to ever increasing demand for shipping and port facilities construction for open seaports along Mediterranean coastline, while the Roman build the famous naval port in Rome at "Tiber river in Odtia". Many of these old ports and harbor have disappeared either being destroyed during war or buried by earth quakes or through neglect and decadence, lack of maintenance. The interchange of good and raw materials between countries and continents reached by maritime traffic as well as the development of powerful navy fleet brought development of large seaports. (Gupta, et, la, 2008).

This also aids new and better repair procedure. New habitation techniques for port structures have also been introduced. Maritime transportation has generally been the most convenient and least expensive means of transporting goods and this is why mankind since ancient times has steadily extending its activities into this area. The history of maritime transportation and port development dates back to the year 3500 B. C. Water transportation has been in steps with the needs of world trade and technical capabilities to build larger ships and ship / cargo handling facilities, water borne traffic has existed on a local basis where small ship sailed out of river ports for other nearby port located in the same river system. (Thomas , B. 1992). Navigational skills ventured into greater distances, the larger ships transporting larger quantities of goods have emerged. As ship traffic increased the existing river ports became over crowded

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SEAPORT SITE SELECTION OF LOCATION

The seaport are regarded as a factor of economic growth in any countries. This is to assess the social and economic impacts of seaport investment for sustainability.

At the time of site selection for a seaport, great care should be exercised and some factors are expected to be put into consideration:-

(a) Availability of cheap land and construction materials.
(b) Natural protection from waves and winds
(c) Transport and communication facilities
(d) Sea-bed, sub-Soil and foundation conditions.
(e) Availability of fresh water and electrical energy
(f) Favourable marine conditions
(g) Defense and strategic aspects
(h) Traffic potentiality of the seaport

The site should have maximum natural protection from winds and waves. It should have sufficiently large pool of water, with adequate depth to accommodate the expected shipping needs as well as to permit the future needs. (Dally H. K. 1981) The marine conditions should be favourable for structures as well as for navigation. To meet this requirement the site should have low tidal range and small tidal currents. There should not be severe wind and waves and the should be less littoral drift. There should be no fog problem at the site. The sea bed should be such that it would hold ship anchors and would not involve much capital and grudging maintenance cost. There should not be excessive siltation nor scour should pose a problem .

Apart from the above conditions the sub soil for foundation purposes should be favourable, The site to be selected should be preferably on an established trade route and have links with other parts of the country, through rail, road air and telephones. The hinter land should be productive enough to support the trade. All these conditions are desirable, but not necessary. (Srikanth S. et, la. 2013). The shape of the seaport must be to protect the seaport from sea waves, one of the pier heads should project a little beyond the others. The inside of the seaport pier-head, the width should widen very rapidly. The general shape of the seaport should be obtained by a series of staring length and no re-entrant angle should be allowed. The seaport depth of the channel is determined by the following :-

$$D = D1 + \frac{H}{3} + D2$$

Where D = depth of the channel
D1 = draft of the largest ship to be accommodated
H = height of storm waves
D2 = allowance for squat of the moving ship.

This is to allow the seaport and approach channel should be of sufficient depth to allow the navigation at low water where the ship is fully loaded. It must be ensured that there should be no obstruction such as boulder or sunken ships up to the required depth for safe navigation.

The maximum seaport depth below the lowest low water should be follows.. When the bed is soft max seaport depth = loaded draft + 1.2m. when bottom is hard i.e. rock bottom max seaport = depth = loaded draft + 1.8 m. (Takahashi, S. 2012).

There is need to undertake the following surveys;_ (i) Marine surveys, (ii) Hydrographic survey and (iii) Topographic survey. The seaport planning should be carried out after collecting the necessary information of the existing features at the proposed site. The following important factors should be studied ;- (a) Survey of the neighborhood including the fore-shore and depths of water in the vicinity. (b) The nature of the seaport, whether sheltered or not. (c) The probable surface condition on land, borings on. (d) The problem of sitting or coast line should be studied. (e) The probable surface condition on land, boring on land which will help in locating the seaport correctly. (f) Natural meteorological phenomenon should be at site with respect to frequency of storms, rainfall, range of tides, maximum and minimum temptation, direction and intensity of wind, humidity, direction and velocity of currents., (Anya, O Anya 2003).

Seaport location area requirement depends upon the following factors factor :- (1) The number of ships and their size to be accommodated at a time. (2) The length and width needed for movement of ships to and from berths. (3) The type of cargo carried. (4) To make the seaport useful for operating and dispatching ships, the water depth in the entrance approach channel and harbor basin should be sufficient even at the lower low water spider tide.

MATERIAL AND METHODS

OTHER FEATURES OF THE SEAPORT FOR SUSTAINABILITY

I. The entrance channel, (ii) Approach channel (iii) Berthing basin (iv) Break waters
II. Turning basin to allow gradual turning of the ship., (v) Quays and wharves (vi) Jetties and Piers (vii) Docks (viii) Slipways (ix) fire protection towers, Mooring

SEAPORT CONSTRUCTION PROJECTS AND APPURTENANCES OF A SEAPORT

Construction activity has been in existence since the caveman started building his dwelling. It has created many wonders in the world and has produced many facilities for the benefit of the mankind . Construction is the major component of the new investments in seaport industry, it is the essential ingredient for the seaport growth of the economy sustainability of any country.

For the proper functioning of a seaport, many structures are to be constructed, these structure are known as appurtenances of the seaport. In short, it can be said that a seaport is built along the shore to berth vessels for loading and unloading is called a Wharves. Warts are built into or on the land. Wharves built along and parallel to the shore are generally called Quays and their protection walls are called quay walls. This Wharves can also be defined as a wall constructed along a shore or bank to berth vessels for operations. (Owoputi, et, la 2020).

Organizing the major works into one or more construction projects for implementation. Seaport building projects contain numerous inter-dependent and inter-related activities. It

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employ voluminous resources. Seaport is a fast changing environments of the present era of global trade impose numerous time, cost, financial, legal, ethical, environmental and logistic constraints . It has inbuilt difficulties, uncertainties and risks. (Harman, 2008).

The studies reveal that most of the construction projects face time and cost over-runs mostly due to management failures,. The construction of seaport industry project required management features, processes, environments and organization which are under the following .:-

- Construction landmarks
- Construction scope
- Seaport project concept and features
- Seaport building project development phases, and process
- Seaport project management practice
- Seaport project management organization
- Seaport project manager role and competency skills
- Seaport main causes of project failure
- Importance of integrated planning, scheduling and controlling of construction projects.-

These are part of the factors , on-land marks:- World famous seaport constructions. World's largest seaport projects and programme and High – Tech seaport building technology.

Seaport construction scope:- Marketing Ability :- International export market, Infrastructure domestic market, Construction participants, Business promoters / clients, Seaport management consultants, Architect engineering Associates, Financial institutions, Input suppliers, Contractors and Stakeholders.

Management Issues

The major implication derived from these studies can be enumerated as:- The process of seaport development design, the type of structural input and the engineering facilities equipment. This form of port building, specialization has implication for provision of facilities at the port. Major problems affecting seaport development is fund and skilled manpower, modern infrastructure materials and equipment. Port congestion through lack of modern handling equipment, lack of spaces, Lack of communication equipment, lack of safety and security in every terminal in the seaport, that are capable of handling and receiving such very large vessels and ships. The adoption of the structural terminal management that represent a dynamic profitable and efficient function of seaport management for sustainable programmes.

Seaport management can best be handle and administered by professional skilled manpower human resources for driven initiative technical management and environmental efficiency. This will promote economic rationality and industrial benefits that will lead to sustainable port infrastructure and terminal utilization. With the above finding, most modern seaport development models are of port – city interface support, private allied business growth, modern industrial development, expansion of value added logistics activities to create

income and revenues. Employment of a variety of related industries loading and off-loading of cargo, storing, distribution. (Canning, D 1999)

With containerization, the extension of hinter lands leads to more overlap among hinterlands of different ports resulting to handled across quays . Demand increment from port activities such as stevedoring, storage , distribution and value added logistics activities can lead to increase in production and employment in local and national economy. Seaport industry can only be possible with production activities of other sectors. Economic activities of hinterland are imperative for existence of seaport industry.

The impact of seaport on developing nations are :- direct impact, ii. Indirect impact iii.. induced impact and iv. Catalytic impact. Seaport investment affects either economy or regional development investment of seaport have been increased urban developments with employment and infrastructure economic growth.

Seaport building failure

A project environment comprises various inter related constituents such as resources, tasks and technology along with the people working against time under stress and strain all of these combine together to achieve the common project objectives. The problems of management are so complex that they defy simple solutions. Some of these are beyond the management's control but some can be avoided. The following causes of seaport failure can be attributed to management failure.

As a result of the need to develop basic seaport Infrastructure all at one time creates large capital operating losses and foregone investment opportunities:-
Under used capacity during the earlier phases of the project led to failure, and the life span of the seaport infrastructure projects often exceeds the time horizon acceptable for private investors and commercial banks. Seaport infrastructure is immobile and has few alternative uses. The linkages between seaports and cities interact a cross many dimensions and the port objectives.

Transport integration, smooth transfer of cargo and equipment from land to water – vehicle / borne system is an essential port function, This does not take place in isolation due to the facts that seaport node within a multimodal transport system is frequently associated with the development of urban center (Owoputi A.E et, la. 2018)

1. Planning failure:- It is due to unclear objectives and targets, unworkable plans, top management's failure to back up the plans, failure to identify critical items, lack of understanding of operating procedures and policy directions, reluctance to take timely decisions and ignorance of appropriate planning tools and techniques.
2. Organisational failure:- It is due to incorrect Organisational Structures resulting in conflict, confusion of responsibility, inadequate delegation of authority at various levels, higher management interference, lack of stress on accountability and a tendency of people to escape responsibility by passing on the buck.
3. Resource Failure:- It is due to an improper choice of the project manager, inexperienced staff, and failure to procure and position resources per the planned schedules.

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4. Directional Failure:- It can be attributed to a lack of team spirit, internal conflicts, poor human resource management, labour strikes.
5. Controlling Failure:- It is due to unclear targets, inadequate information flow, incompetency in adopting appropriate monitoring techniques, and an absence of timely corrective measures. This can be attributed to a breakdown of communication at various levels, lack of day – to – day decisions to fill procedural gaps and an absence of cooperation and esprit de corps. While some failure may be as a result of faulty procurement of machinery and materials, bad workmanship, poor performance of sub- contractors, accidents, unforeseen bad weather and failure to adapt to the local conditions. (International Transport Forum ITF 2011). Global population increasing and growth in social and economic investment and challenges as well as provision of employment and international trade exchange known as export / import practice with unpredictable climate change, issues of sustainable development are assuming greater importance in most corporate strategy sessions , it is of great significance to a wide group of stakeholders in seaport activities.

RESULTS AND DISCUSSION

Seaport with long term aspiration vision to build a World – Class seaport , should involve a company that delivers premium value to stakeholders, should have from inception issues of a sound sustainability practices into the seaport business model. The operation should be able to maximizes all positive impact on various stakeholders groups and minimize , if not totally eliminate the negative impact of our operations.

The finding shows that seaport proactive engagement should have modern global international business organization are more based on accountability of their activities than in the past, stakeholders are interested in the efforts of the company b to go beyond sustainability working in anticipation for greater success, evaluation, expansion by providing more possible technology and technics in its operations. Other view shows that organized scheduled meeting held ad-ho- meeting, organize community meeting with committee and community heads in relating to the projects, Commencements and safety awareness campaigns, organized workshop on small- scale exporter /importer business development and peace building for the community representatives and others stakeholder. Carried out series of joint verification visits and engagements with the encroacher on the proposed seaport site, the environmental impacts, pollution, congestion around the seaport, security issues.

The environmental management priority has a focused on compliance and particular emphasis on areas prone to third party interference. Environmental commitment to sound environment management practice and processes that will secure the government regulatory agency, the directorates of port authority for environmental evaluation studies that will witness heightened operation activities for freight forwarding, logistics warehousing, export / import and export processing zone development, management, expansion and industrial incensement for employment, internal revenue e.t.c. on seaport business expanding hub. The continuous improvement in the environment monitoring and management performance to achieve key performance indicators.

Operations Issues

The process of economic development was summarized in Rostow's seven stages of economic development besides science and technology, labour and capital, the natural resource endowment of nations was considered important in determining there trajectory of development. Hence the concept of the comparative advantage of nations which was the backwardness of Africa's inability to manage, utilize science and technology to facilitate and accelerate it seaport economic development process. Despite the availability of the requisite knowledge management skills and technology within nations, the role of professional manpower remains wide and apparently unbridgeable technics efforts.

A fact of our contemporary world phenomenon of globalization which define the growing economic interdependent increasing volume and variety of cross-border / export / import transaction in goods and services and at the same time shows the disparities and inequalities in management b skills, economic opportunities , Total quality management technics are needed in seaport operation for sustainable factors drive, that will increase continence a higher capacity for prosperity and wealth creation. Hence a seaport operation ability to participate competitively and successfully in world trade is critical to the wealth creation potentials that will enable sustainability. The ability to handle vessels, ships and cargo for import / export will lead to increase production through quality management skilled manpower at the seaport for sustainable.

The political economic of contemporary of management issues in Nigeria Seaport

Despite the massive resource endowments of our seaport, an inexplicable fact of life in Nigeria is the high levels of Unemployment and the poor management skill manpower, Corruption at all levels and the Quality of technology application.

There is need for training of the young generation to develop cross – disciplinary skills required in today's world professional development seaport building for security, and long reward economic infrastructure technologies for deep seaport activities usage and sustainability.

Seaports provide opportunity for commuting of goods and people from one area of the seaport to another area within the location.

Telecommunication skill and equipment at various areas of the seaport for information circulation, security, safety, movement of cargo and passengers.

Large seaport offer particularly attractive locations for industries and distribution-intensive enterprises.

The focuses on reliable, short – transit container services to complete just-in-time (J I T) purchase orders.

Seaport as a determining causal links between public investments and specific commercial activities and investments is difficult and at times speculative.

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Seaport should be managed to achieve optimal Utilization of capital investments in port assets are affected by risk, competition for land and capital or other factors in the competitive business environment.

Subsidies and government provided incentives, distort the allocation of resources for seaport may result in over-or underinvestment.

The provision of seaport services entails large fixed costs and low marginal costs. And a relatively large minimum initial capacity of basic infrastructure is required for technical reasons.

Seaport initial infrastructure is frequently indivisible and as an increase capacity been realized in quantum chunks.

Both seaport construction and seaport expansion require large amounts of capital. Over the last Forty years for example, successive Nigeria government ran deficit budgets even during the times when world oil prices enforced massive inflow of financial resources. Over the same period no credible effort was made to developed professionality in different industries. This undermined skilled competition in economic transactions that aborted the will for good managerial skill development for seaport entrepreneurship and innovation. The enhanced corruption as a way of life Corruption has a direct effect on business management and investment. It makes participation in corrupt practices more lucrative forms of business. It fosters non-productive pursuits such as brokering contracts, in contrary to cost effectiveness and efficiency management.

CONCLUSION AND RECOMMENDATIONS

A workable government policy for modal shift of freight to coastal waterways is required. The policy must be aimed at removing the hurdles that impede the growth of coastal shipping and n must necessarily take into account the impact of external costs of transport modes, ships, vessels. For any seaport to succeed and be sustainable it should consider the following:-

Sustainable partnership should be initiates and build on trust and confidence as well as to strengthened partnership between it and various global seaport, international manufacturing, export organization, import services outlets, logistics and freight forwarding which are aid – users of the seaport. These will contribute to the peaceful operation, environment growth , expansion, other activities , by giving the cordial relationship with shareholders. This will enable the organization to achieve it business goals and sustainability aspirations.

Human-power :- Putting the communities into the forum of participation and representation of government agencies and other stakeholders. Investors who have investment of capital in the organization. Employees who are both skilled and unskilled labour, industry peers in the same operation of services. Government regulatory agencies, insurance agencies, the NGO"s the business partners like importer, exporter. Freight forwarder, logistics transporter and warehouse management agents. All buyers of seaport services and the media houses with a great professional consultant, The training and re-training of staffs,

MONITORING THE ECONOMIC IMPORTANCE OF SEAPORTS

Ports constitute an important economic activity in coastal areas. The higher the throughput of goods and passengers year – on year, the more infrastructure, provisions and associated services are required. These will bring varying degrees of benefit or disadvantage to the local and regional economy and to the environment. Ports are also important for the support of economic activities in the hinter- land since they act as a crucial connection between sea and land transport.

As a supplier of jobs, ports do not only serve an economic but also a social function. Since cargo now a days is loaded and unloaded mechanically, the effects of changes in the amount of goods handled on local employment or the demand for port services is difficult to ascertain.

- Number of incoming and outgoing passengers per port
- Proportion of goods carried cross – channel by rail and by truck.
- Proportion of goods carried by inland waterways short sea routes.
- Volume of goods handled per port terminals
- Direct added value of ports

The environmental management priority has a focused on compliance and particular emphasis on areas prone to third party interference. Environmental commitment to sound environment management practice and processes that will secure the government regulatory agency, the directorates of port authority for environmental evaluation studies that will witness heightened operation activities for freight forwarding, logistics warehousing, export / import and export processing zone development, management, expansion and industrial incensement for employment, internal revenue e.t.c. on seaport business expanding hub. The continuous improvement in the environment monitoring and management performance to achieve key performance indicators.

From our observation, the science and practice of port and harbor engineering draw from various disciplines and cover a broad area in interrelated include all detailed analytical procedures from dredging, port operation and maintenance to provide marine structure designers with state of the art information associated with port activities.

Containers were standardized by ISO internationally to 20 or 40ft in length (6.06m or 12. 19m) with the outside width and height being 8ft (2.44m) 20ft, Container range 28 to 36 kn. Or total weight of 305 kn. The efficient handling of containers stimulated the development of new equipment, such as straddle, carriers, heavy lift – forklift trucks,, gantry cranes, special tractors and others. The roll -on-roll-off method of handling containers have been development and used globally. The need for large open areas to accommodate a modern container facility has induced ports to move to the periphery of cities and often on poor quality land. Area of major controversy related mostly to dredging and disposal of the contaminated dredged soils and dredging have been found in constructing offshore island ports and moving the up- river shallow draft ports down rivers to deeper waters. Handling of liquid and dry bulk cargoes and movements of liquid bulk petroleum products by ship started with special tanks mounted onto existing vessels moving liquids for efficient way of transporting ever increasing quantities as mankind moved into petroleum trade,

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New Habitation techniques for port structures have also been introduced

- There are new development of seaport structures and modernization of existing structures base on advances analytical design methods as well as on result of numerous scale model tests and field investigations all over the world
- The use of highly advance methods of soil foundation investigation and thorough understanding of the principles of soil / structure interaction in the marine / seaport environment.
- Computer have revolutionized the process and procedures of structural engineering seaport models and have been greatly developed and used for seaport design of various marine / seaport structures to increased productivity and sustainability management.
- The engineering designer realize that formulation of mathematical approach for structured analysis must be practical and compatible for sustainable management, in shearing strength, consolidation characteristics of the seaport and its backfill soils environment and live loads.
- The designed loads and their combinations that are commonly used to design water / seaport front structures.
- Information on soils / seaport structure interaction that explains basic principles that affect soil lateral thrust against rigid and flexible soil retaining structures.
- The principles of offshore seaport design terminal and gravity quay walls, sheet pile bulk heads and piled port structures.
- The existing water front structure that makes them usable in modern port building for operations .
- The construction of break water for interaction between the environmental agents, such as waves currents, wind, harbor materials with bottom fixed seaport structure.

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