

**INFORMATION TECHNOLOGY AND  
SUSTAINABLE DEVELOPMENT IN THE  
MARITIME INDUSTRY IN NIGERIA  
(A CASE STUDY OF NIMASA)**

**BY**

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## CERTIFICATION

This to certify that the project work entitled “ **INFORMATION TECHNOLOGY AND SUSTAINABLE DEVELOPMENT IN THE MARITIME INDUSTRY IN NIGERIA.** ” was carried by Mohammed Inuwa Sadiq under the Supervision of Dr. L. Okoroji. In the department of transport management technology.

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## **DEDICATION**

. This work is dedicated to my Family

## **ACKNOWLEDGEMENT**

I wish to express my profound gratitude to my Dr. Okoroji who tirelessly ensure that this piece of academic work becomes a reality despite his tight schedules.

And to those who contributed directly and indirectly to the successful completion of this work.

## TABLE OF CONTENTS

TITLE PAGE	i
CERTIFICATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
TABLE OF CONTENT	vii
<b>CHAPTER ONE</b>	
1.0 INTRODUCTION	1
1.1 STATEMENT OF THE PROBLE	4
1.2 AIM AND OBJECTIVE OF THE STUDY	6
1.3 RESEARCH QUESTION	7
1.4 SIGNIFICANCE OF THE STUDY	7
1.5 SCOPE OF THE STUDY	8
1.6 LIMITATION OF THE STUDY	8
1.7 ORGANISATION OF THE STUDY	9
1.8 DEFINITION OF TERMS	10
<b>CHAPTER TWO</b>	
2.0 LITERATURE REVIEW	13
2.1 FUNCTION OF NIMASA	14
2.2 DEFINITION OF INFORMATION TECHNOLOGY	21
2.3 LEVEL OF I.T DEVELOPMENT IN NIMASA	22
2.3.1 CHALLENGES	27
2.4 ESTABLISHMENT OF I.T POLICY	29
2.4.1 POLICY IMPLEMENTATION	30
2.5 INVESTMENT OF I.T IN MARITIME INDUSTRY	31
2.5.1 ADANTAGES OF I.T INVESTMENT	32
2.6 ELECTRONIC SERVICES AND APPLICATION IN MARITIME INDUSTRY.	33
2.7 SOME I.T EQUIPMENTS AND THIER SERVICES	34
2.8 THE RISK IN I.T PROJECTS.	38
2.9 RISK REDUCTION	44
2.10 INFORMATION TECHNOLOGY AND GLOBALISATION	46

<b>CHAPTER 3</b>		
3.0	METHODOLOGY	49
3.1.1	TYPES OF DATA	49
3.1.1	PRIMARY DATA	49
3.1.2	SECODARY DATA	50
3.2	RESEARCH INSTRUMENT	50
3.3	RESEARCH DESIGN	50
3.4	POPULATION OF STUDY	50
3.5	RESEARCH HYPOTHESIS	51
3.6	TECHNIQUE OF DATA ANALYSIS	51
3.7	RESEARCH SPECIFIC METHODOLOGY	52
3.8	QUALITATIVE RESEARCH METHODOLOGY	53
3.9	CASE STUDY RESEARCH METHOD	54
<b>CHAPTER 4</b>		
4.0	DATA PRESENTATION, ANALYSIS AND INTERPRETATION	57
4.1	DATA ANALYSIS	57
4.2	RESEARCH QUESTION	58
4.3.1	RESEARCH FINDINGS/ INTERPRETATIONS	68
4.3.2	RESEARCH FINDINGS/ INTERPRETATIONS	69
<b>CHAPTER 5</b>		
5.0	SUMMARY OF MAJOR FINDINGS	73
5.1	CONCLUSION	73
5.3	LIMITATIONS	74
5.4	RECOMMENDATION	75
QUESTIONNAIRES		
REFERENCES		

## **ABSTRACT**

The Nigerian Maritime Administration and Safety Agency is a maritime regulatory agency and concerns with enormous responsibilities such as promoting indigenous shipping lines, shipping development, pollution control, ensuring adherence with IMO and ILO conventions among others,

So based on the above functions, the research work will look into Information Technology as a sustainable index in the maritime industry. The research will first look into the development of information technology in NIMASA, evaluate the problems being encountered in usage of this technology within the organisation, find ways of improving its application in the organisation and the benefits it give to the organisation in particular and maritime industry in general. The research work will look into ways of assisting the organisation through training and retraining of staff in order to deliver quality service to maritime industry.

It will also review and look at some Information Technology equipments being used in maritime industry world wide and it will go further to discuss risks in information technology projects

## **CHAPTER ONE**

### **1.0 BACKGROUND INFORMATION**

The Nigeria Maritime Administration and Safety Agency (NAMASA) is the apex regulatory and promotional maritime agency. The agency was created from the merger of Nigerian Maritime Authority and Joint Maritime Labour and Industrial Council (former parastatals of the federal ministry of the transport) on the 1<sup>st</sup> August 2006. The mandates of the agency are derived from the following:

1. Merchant Shipping Act
2. National Shipping Act
3. Maritime labour Act
4. Coastal and inland Shipping (cabotage) Act.

Joint Maritime Labour Industrial Council (JOMALIC) was created in accordance with the Nigeria Dock labour Act No. 37 of 1999. this act was later repelled and the Nigeria Maritime labour act 2003 was enacted and the scope (JOMALIC ) was expanded to incorporate the activities of the Nigeria seafarers which were hitherto handled by the defunct Nigeria shipping federation. The Joint Maritime Labour Industrial Council (JOMALIC) until 2006 when merge with the National Maritime Authority (NMA) and subsequently become a department in the directorate of operation in the Nigeria Maritime Administration and Safety Agency (NIMASA).

The Acts that Establish NIMASA confers the following function on the Agency

:-

- ❖ To correct the imbalance in the nation seaborne Trade by promoting indigenous shipping lines to Participate in the trade.
- ❖ To assist indigenous shipping lines to acquire Ships and to develop the maritime infrastructure.
- ❖ To carry out the function of maritime safety Administration
- ❖ To refocus and reposition the Agency's maritime Labour sector (Dock work and Seafaring) for
- ❖ Enhance welfare and productivity.
- ❖ To implement the Agency's statutory function as annunciated in the Nigeria maritime labour Act 2003.
- ❖ To relate effectively with the international Labour organizational (ILO) and non- Governmental organization (NGO) in the Maritime labour sector
- ❖ Ensure adherence of operations to international conventions and other relevant national laws.
- ❖ To enhance the provisions of the coastal and inland shipping (sabotage) Act 2003. Finally to achieve safe, secure shipping, cleaner oceans and enhance maritime capacity in line with best global practice towards Nigerians economic development.

In view of the enormous function of the Agency as enumerated above, researchers became attracted to the role of **information technology** (I.T) in the implementation of these functions which throughout the world has, proven to be a key factor for sustainability in the industry. The “sustainability index” of

I.T can be measured from the quality of services that are accessible through I.T. NIMASA has a lot of activities to be accomplished which can be aided by the development of I.T.

Therefore, **INFORMATION TECHNOLOGY** can be defined as any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, interchange, transmission, or reception of data or information. The term information technology includes computer, ancillary equipment, software, firmware and similar procedures, service (including support service) and related resources.

However NIMASA will achieve a lot by strengthening deeper into I.T for a sustainable index in Nigeria maritime sector (researcher 2007).

## **1.1 STATEMENT OF THE PROBLEM**

In the global market, sustainable index in all facets of human endeavour has been directed towards information technology (I.T) development the success of industrial competition are numerous to mention. The trend of I.T application in Nigeria maritime industry has suffered greatly and dented by some major problem. NIMASA as a regulatory body in Nigeria Maritime Industry has vital role to play in ensuring that standards are enforce. There are problems identified with proper I.T. development are listed below

### **ADMINISTRATIVE PROBLEM**

The inconsistency in NIMASA management is a major problem in implementating a substantial development in I.T. The over-sight function of

government in the agency pose a problem. Corruption, un-professional management , negligence and delay in implementing such a huge project.

### **DEVELOPMENT OF I.T IN NIMASA**

The fund required to develop a sustainable I.T in NIMASA is huge. Cost of acquiring systems, computer installation and its maintenance. However, research shows that in the past, development plans in NIMASA is poorly carried out, therefore poses doubt on the I.T reform of the administration especially the issue of accountability and transparency are concerned.

### **INVESTMENT PROBLEM**

Californians technology, budget is well over \$1 billion In I.T . Nigeria in generally is rated as a poor investors in I.T and NIMASA as government agency cannot be exonerated from the general phenomena. The non-chalant attitude towards investment in the major I.T indices such as software, telecommunication, automated tracking machines (e.g. NICOMST 1 satellite). Traffic data information system, biometric cards internet, fax services and other information transaction machines will be the bane of the maritime industry, if urgent attention are not geared towards addressing them.

### **TRAINING AND COMPETENCY PROBLEM**

In NIMASA, I.T investment predominantly suffers set back, due to lack of trained personnel. This is a major problem confronting I.T development in NIMASA and the maritime industry Nigeria. There are lots of programmes and

packages in I.T that lack operators/users in the industry that would have grossly improve services, etc.

## **1.2 AIMS AND OBJECTIVES OF THE STUDY**

The research work aims at exploring ways of making the I.T in NIMASA more functional than what is obtained presently, so as to be able to meet what is obtainable internationally and also reform I.T. level in Nimasa as a way of improving performance in maritime activities. And also t look at application of I.T. in maritime industry.

### **OBJECTIVES:**

- To evaluate the existing I.T position in NIMASA and the rest of maritime industry
- To suggest to NIMASA needs of implementing policies on I.T application in Maritime industry.
- To submit a copy of the project to NIMASA for implementation.

## **1.3 RESEARCH QUESTION**

Based on the objectives of the study, the following questions were formulated:

- Of what needs are I.T. development in NIMASA ?
- Has I.T. given the required efficiency as presumed by the Agency?
- What is the likely problems encountered in I.T. development?
- Are there ways of improving?

- In what ways can the problems be improved ?
- Is I.T. development responsible in Agency failure to meet international standard?
- If yes how and why?

#### **1.4 SIGNIFICANCE OF THE STUDY**

The Japanese word “Dantotsu” (striving to be the best) captures the essence of I.T. development in NIMASA. Information Technology is central to our economy and to our society. It drives many of today’s innovation and it offers enormous potential for further innovations in the coming decades. Therefore the significance of this study narrows to; Finding our any problems in NIMASA management

- The knowledge will provide ways of improving I.T. application in the organisation.
- It will showcase the benefits the entire organisation and maritime industry will again.
- It will look for possible ways of assisting, training and retraining personnel in NIMASA to deliver quality services to the maritime industry.

This research work is undertaken to outline the problems affecting the Agency’s operations optimal utility and loss of wealth in the country’s economic gateway. Finally, it will reflect the constraints created directly or indirectly by the various bodies in implementing/adopting I.T. in their respective dealings to standardize maritime industry in Nigeria.

## **1.5 SCOPE OF THE STUDY**

It is designed to develop sustainable index in maritime industry. The dos and don'ts in I.T. development around NIMASA. It also exposes relationship between NIMASA and the maritime industry in general .

## **1.6 LIMITATION OF THE STUDY**

The research work will be limited within NIMASA and maritime industry in Nigeria. Due to the explicit time and huge finance required in gathering data and information, problem of information and material availability, Nigeria has been poor in I.T. It proves most difficult to obtain the substantial documents in I.T.

All these contributed to the researcher s area of limitation in order to have an unbeatable work.

## **1.7 ORGANISATION OF THE STUDY**

This research is work is organised in five chapters to allow good presentation and understanding at a glance. Chapter one is focused on the general introduction thereby highlighting on the background study, statement of the problems, propose of the study, research question and test hypothesis.

Chapter two forms the core study of this work with focus on the related and relevant literatures,

Also chapter three deals with methods and procedures for solution and collection of data necessary for this work while chapter four covers data analysis, presentation and interpretation.

Other statistical tools are used for better interpretation and presentation of data,

The fifth chapter shall look into summary, conclusions, recommendation of the work. The last shall contain the bibliography, which is the reference of all the materials used

## **1.8 DEFINITION OF TERMS**

**COMPUTER:** - A computer is a set of electronic equipment that accepts data as input, process them with the aid of predefined programmes and produce useful output for management (or any other peoples) to use.

**INTERNET :-** (Otherwise called international network.)

This is a global collection of many different types of computer networks that are linked together.

**CPR** - Computer planning and research

**E-MAIL:-** (Electronic mail)

E-mail is a common resource providing by internet.

it is worldwide system for sending and receiving mails

through electronic system.

TELECOMMUNICATION: - transmission between or among points specified by the users without change in form or content of the information as sent and received.

ICT: - Information communication technologies

AMMITEC:- Association of maritime manager of I.T and communication

TTY: - An abbreviation of teletypewriter machine or equipment that is employs interactive text based on communication through the transmission of coded signal though telephone network.

NIRA: - Nigeria internet registration Association

ORACLE E-BESINESS:- This is a computer package for entire financial, inventory, purchasing and human resources. It deals with database management.

MARITIME: - It is where sailors or shipping activities take place (i.e. import and export).

SHIPPING COMPANIES: - These are those firms that engage themselves or are involved in organization and running of water transportation or related business by providing service through the movement of goods and passengers from one destination to another.

TREM: - Is a software for central invoicing system used by Shipping development and finance department (Credit control).

ACCPAC: - Is a software running under the flat form of pervasive SQL database used for integrated accounting system.

ROLLCALL: - personal and human resources management system software package

LAN: - Local Area Network

MAN: - Metropolitan Area Network

VPN: - Virtual private Network

COMPUTER NETWORK: - A computer network is simply two or more computers connected together so that they can exchange information.

BENCHMARK: - Is an operation to be performed on a computer to ascertain its effectiveness. It is normally used by users to evaluate hardware and software performance.

INMARST- International Maritime Satellite Communications

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

A maritime industry is simply an industry charged with marine activities or sea-borne trade including shipping (import /export) and sailing etc. (source).

The Nigeria maritime Administration and safety agency (NIMASA) began its operation on 1<sup>st</sup> August 2006, with the mandate to promote and expand opportunities for the growth of maritime commerce in Nigeria. The Agency aims and objectives are many such as, to study the performance of Nigeria economy as it relates to the maritime sub-sector, to provide necessary information for pool, for strategic planning, for constant updating and upgrading of the Nigeria maritime industry etc. However the subject matter of this project research is the sustainability index for I.T (information technology) application in Maritime industry with the NIMASA as the case study. The growth of the industry to a certain level is anchored towards the level of its connectivity I.T wise (alameda, 2003). NIMASA having a big role to play in maritime industry in Nigeria has commenced the use of information technology in its daily activities. The introduction of this I.T is still developing and requires huge investment. Departments like ship registry unit in NIMASA today is already online with internet access. We shall look at challenges so far on I.T development in this sector and ways of improving them. Today maritime industry in developed countries of Europe, America and even some developing countries today are fully I.T users.

The research will attempt to review the functions of NIMASA and also at look the position of Information Technology in terms of hardware and software as it will improve efficiency in the organisation. It will review the position of the IT level in NIMASA and relate its functions so that it can look at the current problems with an aim of improving the functions of the organisation.

## **2.1 FUNTIONS OF NIMASA:**

The main function of NIMASA is the regulation of the maritime sector of the nations economy in line with best global practices, with a “vision” committed to making Nigeria a major maritime nation and a “mission” to achieve safe and secure shipping, cleaner oceans and enhanced maritime capacity in line with best global practices. NIMASA’S role in the maritime sector includes.

## **SHIPPING DEVELOPMENT**

The shipping development is primarily responsible for the growth of indigenous shipping facilities, effective participation of indigenous operators in domestic and international shipping trade. The department activities includes:-

- Conceptualization, design and implementation of shipping development initiatives, strategies and programs.
- Study and identify critical factors affecting the development and growth of the indigenous shipping industry and advice on appropriate programme of action and/or policy option

- Undertake periodically, a comparative study on contemporary industry development strategy in selected countries/ experiences.
- Establish a linkage and liaison with relevant bodies of indigenous operators/ stake holders for the purpose of information on the needs, desires and expectation of indigenous operator vis-a-vis the role of the agency.
- Maintain currency on global industry and provide advisory services to indigenous operators on contemporary issues that affect their competitive efficiency.
- Identify and advise on the activities of other government agencies with direct and indirect implication on the performance of the local industry.
- Articulate and develop appropriate evaluation mechanism for appraising the performance of indigenous vis-a-vis the agency's development assistance programmes.
- Maintain appropriate databank on key performance indices.

### **MARITIME SAFETY AND SEAFARERS STANDARD**

This department is charged with the responsibility of ensuring maritime safety and seafarer standards under the national shipping policy. Some of these include:-

- ❖ Flag state implementation and port state control .
- ❖ Implementation and enforcement of safety standards whether Under domestic laws or international conventions eg.SOLAS COLREG, LOAD LINE, TONNAGE.

- ❖ Ensuring adequate training and certification of seafarers in line with the standard for training, certification and watch keeping of Seafarers (STCWGS) requirement .
- ❖ Enforce security regulations under the maritime safety Administration (MSA) and ISPS code 2002.
- ❖ Enforcement of all maritime safety conventions Adopted by Nigeria and SAR convention 1979.

### **SHIP REGISTRY**

Besides its traditional functions of maintaining the ships registry and protecting the integrity of the records stored therein, NIMASA ship registry department has responsibility for the following:

- ❖ Ensure that national and international rules on safety are Adhered to and respected (in conjunction with the maritime safety Department).
- ❖ Avail and periodically update indigenous maritime operators with Extant requirement of national and international regulatory Bodies such as international maritime (IMO), Flag state, Classification societies, etc.
- ❖ Maintain a balance between its functions as a regulator and a Services provider on issues pertaining to choice of flag state.
- ❖ Partner with relevant bodies and organization to maintain high standards in shipping.
- ❖ Provide training support for the indigenous shipping industry Through assistance for the training of seamen, cadet sponsorship And facilitation of sea time exposure.

- ❖ Ensure 24hours access of the registry with functional internet Website to compete effectively in the modern global ship registry.

## **CABOTAGE ENFORCEMENT**

The coast and inland shipping (cabotage)Act, 2003 was enacted by The government purposely to encourage participation in domestic shipping trade.

The cabotage unit in NIMASA is saddled with these Responsibilities:

- ❖ Ensure indigenous control of domestic shipping
- ❖ Administration of cabotage vessels monitoring
- ❖ Restriction of use of foreign vessels in cabotage trade zone.

## **POLLUTION PREVENTION AND CONTROL**

This unit in line with NIMASA compliance with the IMO'S objective of clean ocean from time to time carries out aerial surveillance of the nation's offshore water to detect illegal dumping of wastes by ships. This entails:

- ❖ Provision of the necessary oil reception facilities/ infrastructure to prevent pollution from ships
- ❖ Control ship pollution with a view to minimizing damage to Marine environment.
- ❖ Enforcing marine anti pollution laws under the domestic laws and The international convention for the prevention of pollution from Ships MARPOL 73/78.
- ❖ Enforce the civil liability laws/convention 92 on pollution from ship.

- ❖ Ensure the payment of compensation under the domestic Compensation laws and (IOPC Convention 92) in case of Pollution from ship.
- ❖ NIMASA is also to enforce the international convention relating to intervention on the high seas in case of oil Pollution casualties which came into force in 1975.
- ❖ Implementing the international convention on oil pollution
- ❖ Preparedness, response and cooperation (OPC) 1990 which came in to force in 1995.

## **MARITIME LABOUR SERVICE**

This department is responsible for labour matters in the maritime sector.

Some of the activities include:

- Registration of seafarers and seafarer's employer.
- Registration of dock labour employers, stevedoring and terminal Operators
- Establishment of marine welfare disengagement scheme.
- Establishment of pool of seafarers.
- Issuance of seafarer's identification document.
- To ensure compliance with national and international Labour organisation convention
- Development strategy (NEEDS) Safety of life at sea(SOLAS)
- Ascertaining any deviations and recommend remedial measures.

## **PLANING, RESEARCH AND DMS (IT) INFORMATION TECHNOLOGY**

Unlike in the past, the agency's operation activities are now I.T Driven in line with international best practices. There is availability of:

- 24hours internet access
- Electronic ship registration
- The Agency is training her staff towards the advent of a paperless Office environment.
- Systematic computerization of all offices with the plan that every staff, junior and senior must have a workstation.
- Maintenance of all computer systems in the agency.
- Development and maintenance of in house application software.
- Training of agency's staff.
- Preparation of corporate rolling plan.
- Coordination and implementation of corporate budget.
- Project evaluation and monitoring.
- Research.
- Preparation of annual report
- Conference and seminars.
- Initiating shipping policy studies.

## **RESOURCE CENTRE**

This function includes:

- Established research based information and database that will shape government policies and programmes on maritime related matters as well as national conventions and protocols on maritime affairs.

- Research and co-ordinate information and services to facilitate the creation and growth of maritime operations and administration nationally and internationally.
- Upgrading the training standard of maritime education and the development of new and simplified but comprehensive ways of learning.etc.

## **2.2 DEFINITION OF I.T**

Information technology is any equipment or interconnected computer system or subsystem of equipment that is used in the automatic acquisition of data, storage, manipulation, management, movement, control, display, switching, interchange, transmission or reception of data or information. The term information technology includes computers, ancillary equipment, software, firmware and similar procedure services (including support services).

Information technology is central to our society economically and socially. It drives many of today's innovations and it offers enormous potential for further innovation in the coming decades.

Generally, the rise in global information is without its implication for Africa and Nigeria in particular. This implication is borne out of the fact that information technology has the potential to impact positively on the social, political, economic, educational, scientific, technological and other aspects of the lives of its people (Adomi, 2005). Though some people still believed that the impact of IT will accelerate the marginalisation of the African continent, as the gap among those who are linked up to the internet and those who are not grows. It is generally believed that the African disadvantage is a function of its

underdevelopment, and of the low density of telephone connections (African Policy Information Centre, 1996).

The history of innovation in information technology needs to be better understood. Because the financial reward in the information technology is so great. It is tempting to believe that the industry must have been responsible for most of the fundamental innovations and can be relied upon exclusively in the future. However, NIMASA needs to develop I.T as a Professional and wealth driven one in the maritime sector. Sustainability of its application will be measured by the level of ground investment, level of utility and staff awareness as there are equally failures in I.T (Philip Isenberg).

Similarly, electronic and information technology includes information technology and any equipment or interconnected system or subsystem of equipment, that is used in the creation, conversion, or duplication of data or information. The term electronics and information includes, but is not limited to telecommunications products (such as telephone), information kiosks and transaction machines, worldwide websites, multimedia, and office equipment such as copiers and fax machines. These important definitions will help us to understand our direction in investing properly in I.T to improve performance in Maritime.

### **2.3 LEVEL OF I.T DEVELOPMENT IN NIMASA**

Taking a look at I.T development in NIMASA, what is on ground and things yet to be done, Appraise it and that will automatically give an answer to the question of I.T development /application in maritime industry. Nigeria is believed to have little investment in I.T and experts say I.T bridges opportunities and competitiveness in international market.

## **AN OVERVIEW OF NIMASA I.T INFRASTRUCTURE**

1. NIMASA network enterprise comprises of the following:

- NIMASA local Area network (LAN)
- cat 5 cabling scheme
- 3com switching/hubs
- 2m dish (DOPC) back up
- Fibre optic internet connection to ISP
- 6HPcompaq proliant ML370- servers
- 2HP Compaq proliant ML530- servers
- Linux based internet gateway (under evaluation)
- 6-6KVA ups and (2)6KVA stabilizer

2 LOCAL AREA NETWORK (LAN) at Tin can – island ports, which comprises of 48 port switche patch panels

3 APAPA PORT (LAN) AS ABOVE

The LAN was inter – connected to NIMASA Headquarter on April 11 referred as NIMASA (MAN)-Metropolitan Area network.

HARDWARE EQUIPMENTS PRESENT ARE:

- 40 notebook computers and workstations

## SOFTWARES PRESENT ARE:

- Window 2000 advance server
- Microsoft windows XP
- Microsoft office XP
- MS SQL server 2000 Enterprise
- MC fee TVD
- Windows 2000 professional

An overview of application software in NIMASA and there application

### 1. ACCPAC software running under the flat form of pervasive SQL

Database; this software can be used in

- Cash book module
- Account receivable
- Account payable
- General ledger and
- Inventory.

### 2. TRIM software

Oracle database 9i

This can be used by shipping development and finance department (credit control unit) in

- Raising of manifest
- Raising of debt note and
- Printing of report of generated 3% revenue.

### 3.PAYROLL software

Oracle 9i database

This software is used in finance department, Which can is used for processing and administering database information of all staff salaries, wages and other financial record keeping and activities.

### 4.ROLLCALL software

MS SQL Database

Admin and personnel department uses this software, This software can be modified as what we have / call human resources software used in

- Promotion assessment
- Staff loan
- Transfer
- staff allowances
- Query, suspension, terminate etc
- Insurance/ pension etc.

The term software means programs to used operate computers and related devices or is a collection of computer programs, procedures and documentation that perform some tasks on a computer. Software in NIMASA has been seamlessly interfaced together to achieve real-time computing

Recently, the Agency deployed “3COM firewall” and filter hardware for intrusion detection and protection against malicious network hackers/attackers. This is to further straighten with the establishment of VPN Equally, for the agency to maintain fast, secure and reliable communication between office VPN (Virtual Private Network),which gives the agency a way of extending security network using regular internal pathway.

Unlike what obtained in the past, now all activities in the agency are I.T driven. NIMASA runs a 24hours “internet” access:

Internet means “A large group of computers join together to form a large network internationally. The “internet” is made up of computers in more than 100 countries covering commercial, academic and government endeavours. This has made information and communication cheap, easy and reliable in the organisation. Staffs can reach their respective client easily and send documents on E-mail. Similarly electronics ship register is in use in the ship registry department of NIMASA. This investment is vital in the maritime industry. The maritime industry through this investment in NIMASA can have a full database information of their ship, more so it has reduced paper work, and easy access/registration.

### **2.3.1 CHALLENGES**

The challenges the agency is facing now, is knowledge gap, required infrastructure to meet up today's challenge, a lot needs to be invested in IT in order to meet global challenges that is obtained today. Examples of areas that need to be looked in to, seriously are training of staff in IT, provision of required software to manage the agency's activities which will definitely provide efficiency, such areas are:- personnel department with a software that will cover it's activities such as personnel data, payroll, pension, insurance etc. though the finance department has already began automating it's activities, but it requires constant updating to meet the requirement of ever changing technology. Other requirement in terms of software are:- data security software, network security software, backup/recovering software, internet management software etc. although most of the software mentioned are available in the agency's system, but they require continues maintenance (updation) to meet ever changing technology. Also the following need to be taken in to consideration immediately.

- Acquisition of HP open view automatic backup/recovery system.
- Configuration and implementation training of HP open view.
- Specialized training on data recovery in windows 2000/Compaq environment.
- Installation of Linux operating system for higher security in database management and skilled personnel to manage.
- Immediate planning and processing of data recovery centre.

These issues call for serious answers. But the agency is facing a lot of challenges in I.T. If sustainability in I.T application is to be met in maritime industries here in Nigeria, much should go to this unit as investment. The key challenges we may look at are:

Training

Management

Career

Establishment of I.T policy

Implementation of the policy

### **2.3.2 TRAINING**

Dr Obaji (vanguard,1/2007)"Nigerians can only be competitive if they were empowered with I.T tools and knowledge for the challenges ahead" The need for training and re-training can not be overemphasized in IT today. Maritime activities require special skills to monitor and manage. The cost incurred on paper work, communication, transport and security is high. However, the ever growing interest to train staff by I.T unit in NIMASA so as to be acquainted and accustomed to maritime I.T base practices. Today the agency has over ten staff in charge of it's IT unit and they also assist in training staff. and also training is provide by industry people and academia.

#### **CAREER**

Career personnel in I.T unit are needed and should be remunerated high to encourage efficiency and high productivity.

## **2.4 ESTABLISHMENT OF I.T POLICY**

Policy is the rules and regulations set by the organization. Policy determines the type of internal and external information resources employees can access, the kinds of programs they may install on their own computers as well as their authority for reserving network resources. Policy is also related to network quality of service (QoS), because it can define priorities by user, workgroup or application with regard to reserving network bandwidth.

All information technology department must develop, exercise and maintain recovery plans necessary for the protection of information and business activities. Plans must address the full range of processes, including data processing, data communications links, personnel, personal computers, workspace and documents. The issue of policy like the disaster recovery policy is a crucial one. This policy applies to all centrally managed information systems under the jurisdiction of the director – PRDMS in NIMASA. This disaster recovery policy is based on realization that authority will be critically dependent on its computer system and network, and, the understanding that disaster planning is necessary in protection information assets and a operations to the benefit of I.T in maritime industry.

I.T. Policy establishment is a challenge to I.T unit in NIMASA which management should take cognizance of.

### **2.4.1 POLICY IMPLEMENTATION**

Policy implementation is a major problem confronting government agencies in Nigeria (Ezekwesiri 2006). Such policy as “Disaster recovery policy” should not be over-emphasized, it is obvious that international standard must be

incorporated in our maritime industry otherwise the eluding wealth and standardization becomes history. Establishment of the policy is no longer factor but its implementation. If this policy is be implemented the following will be achieved.

- This policy will see that all assets within areas of control will be identified and protected
- Implementing and observing security and privacy policies, and procedure.
- Ensuring that all employees understand their obligation to protect the authority's assets
- Ensuring the safety of employees by maintaining emergency procedures and keeping employees aware of building evacuation procedures, fire drills CPK training, and what to do if someone is critically injured.
- Ensure that all employees personal computers have software installed to detect and protect against computer viruses
- Ensure compliance to IMO and ILO standards and non arbitration of website rights etc.

## **2.5 INVESTMENT OF I.T. IN MARITIME INDUSTRY**

Information Technology is a global challenge which has taken lead in every organization. The low interest in any government to build a sustainable I.T environment is narrowed to low economic development /lack competitiveness in international standard among others. In the communication sector and software solutions the investments are not following the same trend in the country's ocean- going organisation. The obstacle for the adoption of electronic services according shipping companies are the following :- cost of

acquisition, lack of technical support, as well as high cost of satellite communication services, the compatibility problems into the framework of processes and the lack of standardization in digital forms and documents that constrain the advantages coming from the adaptation of electronic software solutions.

Similarly, the causes are numerous to mention but before I.T sustainability index is reached in a complex agency like NIMASA as discussed, poor or lack of implementation of viable policy by the I.T unit must be tackled effectively.

### **2.5.1 ADVANTAGES OF I.T INVESTMENT**

It is reckoned that one of the ways of organizational change is to make investment in information technology (I.T) and communications. This, in turn facilitates knowledge sharing and build the behaviours, attitudes and values that help embed a term working culture.

Nowadays organizations are becoming increasingly reliant on computerized information systems due to the globalization process and the market changes. In any case, the oncoming use of common standards for transactions will be standardized, thus the use of internet based applications, will flourish in maritime practices, processes and transactions, leading to a modernization of shipping companies in all aspects and levels of operations between ship and shore. Shipping companies should aim to achieve inter -perability between the already installed applications if possible in order to fully unite them into one integrated information system.

To increase the use of internet, personnel are to be familiarized with the internet applications and to improve the corporate website of the shipping

company, as it is used for marketing purposes. In any case the support of the shipping company with key personnel specialized in information systems and information technology is very important. Based on the strategic planning, every ship management company that focuses on new building project is recommended to give special attention to the installation and development of information systems and new technological equipment for communications.

The adoption of new communication development will decrease the operational cost and in the mean time will increase the speed of communications offering new potential to the organizational and operational frame work of the shipping companies.

## **2.6 ELECTRONIC SERVICES AND APPLICATION IN MARITIME INDUSTRY**

E-business is the most growing process in information technology today. We cannot discuss I.T in maritime industry without referring to e-business application, that is electronic services and application in maritime industry. This was formed in order to deal with the promotion and adoption of telecommunication, software solutions and services in the maritime industry. Particularly. For agency's like NIMASA, that administer ship management companies. The work is focused on the assessment of critical factors of demand and supply on satellite communication and electronic services and solutions in maritime industry.

Study of the necessary business processes and actions that are required, as well as the mechanism of promotion of the technological solutions in the maritime industry.

In the telecommunication market, variety of alternative satellite communication services offered by new providers for many years in the maritime industry such as inmarsat, iridium and global star were the leading products in voice services, whereas VSAT systems provide broadband connection to the ship systems based on geostatic satellites like thuraya in combination with land mobile telephone system.

The choice of the suitable/convenient service depends on the specific user requirement. The fast pace of satellite telecommunication developments during the last years resulted in new innovative technologies that will provide broadband connection to the maritime industry. This will result in efficient exchange of data in the industry, total support for total solutions and finally the incorporation of vessels into the corporate network permanently.

The market of electronic services deals with the facilitation of critical maritime business tasks and processes, including among them, chartering, procurement, planned maintenance systems, technical and operational monitoring of vessel, manning quality and safety.

## **2.7 SOME I.T EQUIPMENT AND THEIR APPLICTION IN MARITIME INDUSTRY**

Maritime organizations have a unique set of communications equipments for delivering information to ships at sea through satellite, but can be expensive if not managed properly.

Whether you need to transfer files, deliver the latest ISM safety documents, or provide internet or intranet services on board ship, bandwidth cost are constraining issues, but there are applications that are most cost effective in doing such services.

**IORA MARITIME DATA REPLICATOR-** is a solution that manages delivery of information, through the use of epsilon technology, which compresses data often by 99% of its original sizes, and can be sent to anyone in the smallest possible way, with significant savings in communication. And, once the information is updated, it is available and functional even when offline, giving fast and free access to information on board ship. This technology is vital and recommendable for maritime industries like NIMASA.

Also , iora maritime data replicator can help you deliver automated and optimized solutions in the most cost effective way possible. It also does the following:

- optimize data transfer and reduce cost of satellite data/ transfer, regardless of your communication system.
- Adhere to international regulations that mandates keeping large volume of information on board Ship updated, ensuring it is up-to-date is consistent.
- Provide internet and extranet access on board ship – (iora provide transparent offline to these websites), providing fast and free browsing from on board ship, with highly compressed regular updates to keeping equally reliable information to ship at sea.

## **IRIDIUM- BASED SHIP**

### **TRACKING SOLUTION FOR MARITIME INDUSTRY**

At the 2005 euro port maritime exhibition in Rotterdam, mobile satellite service provider MVS introduced a new ship tracking solution that uses the iridium global satellite network for short- burst data communications. This system

provides real- time vessel monitory and e-mail communications for ships at sea. It provides archiving of collected ship routine data for analysis.

The iridium vessels monitoring system is used for long-range tracking of the location and movements of vessels anywhere in the world” said peter libei”(the vice president, MVS group)

“In addition, the system ship board terminal provides very cost-effective e-mail service and discounted crew calling between ship and shore ” this new service is a major stepping stone towards the development of long-range identification and tracking system to meet emerging international requirement “said Don thoma”. Thus, this innovations are not yet present in marine services in Nigeria.

## **E- BOARDING FOR PORT SECURITY**

e-Boarding is a complete and integrated solution for boarding and loading and traffic (passenger, vehicles and goods) which ensures total compliance with security and control regulations for ports.

The new ISPS code (international ship and facility security) regulations mandate the adoption of security and monitoring system for both accessing port and transiting through the boarding areas.

Since NIMASA adopt ISPS code rules and regulations during all access and boarding operation of passenger’s vehicle and goods. Such tools as part of a complete integrated system, allow port authorities to comply with all ISPS rules and regulations speeding up boarding processes at the same time, all these facts can be translated in to real advantages for passengers, ferry companies, port operations and security Authorities.

## **ACCESS GATES AUTOMATION**

Is an advanced vehicle recognition system designed for issuing boarding card directly at the access gates.

## **BOARDING FLOW CONTROL**

Totally reliable and secure system for managing all access flows to boarding areas.

## **CENTRALIZED CHECK-IN SYSTEM**

A centralized system for ferry companies and better quality services for passengers

## **REAL TIME MONITORING**

A complete system for monitoring both passengers and vehicles access to port areas and managing alerts security levels.

One of the major roles of NIMASA is to ensure maritime security and safety. through the use of these automated I.T products sustainable development can be achieved. Security at port is vital in Nigerian maritime industry. The advent of computer age and investment into I.T by NIMASA should consist widely, spread arms in I.T innovation not just in NIMASA unit but in all tentacles.

## **MARITIME INDUSTRY USES DIGITAL RECORDING TECHNOLOGY**

July 16, 2003 alameda, ca-japans furuno electric co. is a leading global supplier of advanced marine electronics, including radar, navigation equipment, solar, electronic chart display and information systems (ECIDS), GPs devices, and communication electronics.

## **2.8 THE RISKS IN I.T PROJECT**

In 1995, the Standish group began to publish reports of the I.T failure rates of both public and private organizations in the United States. They suggested that more than 80 percent of systems development projects cost more, take longer than planned, and to achieve all of their goals, one third are cancelled before they are completed.

One system development project cancellation took place at the state of California department of motor vehicles (DMV) in the mid -1990s. The project to move nearly 70 million vehicle, license, and identification records from an antiquated system to a new relational database was both behind schedule and over budget. When California's law markers finally decided to end the agency's I.T project \$44 million had already been spent and no end was in sight. One of the reasons the DMV project failed is because the agency staffs were working with a technology they did not understand.

The project also lacked a clear link between agency operational goals and the capabilities of the selected technology.

In fact, government agency's constitutes one of the world's largest consumers of information technology. Because of its size, complexity and pervasive programs and service, government agencies cannot operate effectively without using advanced Information Technology. Some Agencies have the latest technology but can't get their work done as they do before. We have heard about system that performed beautifully, but can't be supported by inhouse staff and therefore continue to generate high costs for consultants to maintain them. Failure may be a desirable state-wide system that local

agencies can,t use because they lack their own expertise and technical infrastructure to connect to it. Failure has been described as an on-time, on-budget system with great user interfaces and functionality, but users will not work with it because they don't trust the underlying data sources. NIMASA in its struggle to innovate and establish a workable I.T should consider, identify risk contingencies and result in more successful innovation. The risk analyzed here is expensive.

### **COMPUTER RISK ANALYSIS**

There are always Risks in a computerized environment that are generated by a variety of threats. Some of these are physical, such as fire, other threats are people oriented, such as errors, omissions act of violence, fraud, etc.

These risks cannot be eliminated, but can be reduced by good computer securities and the security measures that are put in place. Although it is difficult to measure the significance of each factor, it was generally possible to make an overall evaluation.

The organization risk checklist covers;

1. Security Environment
2. Authorization
3. Recording
4. Asset safeguarding
5. Accountability

### **OPERATION SECURITY RISK CHECKLIST**

A list of risks are given in the computer operations. security risks checklists help to explain and uncover the possible risks in a computerized and highly

networked environment. This checklist is used as a tool by the disaster managers to identify what particular areas should be examined in the computer operations the security risks checklist covers:

1. Erroneous or Falsified data input
2. Misuse by Authorized end users
3. System access
4. Application of security practices
5. Procedural and control error
6. Operating system flaws
7. Network system failure

One cannot talk of I.T sustainability without risk involved. Risk management should take priority in NIMASA I.T investments to protect the already existing equipments and the ones yet to arrive.

#### **APPLICATION SYSTEMS RISK IDENTIFICATION:**

External Application characteristics

Is a measure of external characteristics involving an overall application as to the level of risk in an application system. These include the criteria of access risk and control risk.

##### **1. ACCESS RISK CRITERIA;**

- **Technology- Hardware/ software:** The more readily the hardware/software permits access to the data, the higher the risk. for example, on –line database applications over common carrier lines make access theoretically available from any telephone.

- **Security over Access:** The greater the security over the application system, the less the risk of unauthorized or improper acts.
- **Need for private:** The confidentiality of the information affects the need to control, which reduces risk from improper or unauthorized acts

## 2. CONTROL ACCESS;

- The criteria in assessing the control risk include:
- **Skill of system people:** The more highly skilled the system people, the probability that they will build a well controlled and auditable application.
- **Skill of users:** The more highly skilled the users, the Higher the probability that they will manage a well- controlled and auditable application.
- **Statutory body reporting:** The number of statutory agencies that receive reports from an application effect the risk of that application. If erroneous information is sent to statutory bodies, it may result in that agency conducting an investigation and/ or applying sanctions.
- **Experience with technology:** if users and systems personnel in an organizations are very familiar with the technology used for the system, they tend to have fewer problems. But if the personnel are less familiar with the systems , the higher the probability of problems.
- **Sophistication of system:** The high the skill level required to interface with the system, the higher the risk of doing something wrong. In other worlds, if the system is over engineered for the types of people using it,

- they will either make mistakes or will not use control features in the system because they do not understand them. Etc mean- while I.T environment like the

## **AUDITABILITY RISK CRITERIA**

The criteria considered in assessing the audit ability risk include;

- **user monitoring involvement:** The more heavily the user is involved in monitoring the results of the system, the less risk those errors will go undetected.
- **Numbering of changes to system:** The higher the number of changes, the higher the risk that those changes will cause problems.
- **Ease of obtaining data from system:** The more difficult it is to monitor and to reconstruct processing.
- **Impact of system failure:** The more integrated an application system is into the day – to day operation of the authority, the impact of the system failure.

## **PHYSICAL RISK**

The result of this analysis should be funded by the agency as a pre disaster precautionary measure.

An I.T environment cannot be sustained affectively without benchmarking way to proffer solutions to risk; because computer risk is devastating. The physical risk analysis covered here are;

- Fire
- Flood

- Lighting
- Sabotage
- Power failure
- Conditioning
- floor/ Roof/Wall collapse

## **2.9 RISK REDUCTION**

### **COMPUTER DATA REDUCTION**

Computer data is protected by a combination of backup procedures. A backup process is the copying of the data from disk to magnetic tape or cartridge so that data is not lost or damaged for any reason and can be restored. Offsite storage for these media, protects the data in the event that the computer itself is destroyed due to a disaster in or surrounding the area where servers are located.

### **CYBER PROTECTION**

However, NIMASA I.T unit has acquired anti-virus software, firewall hardware and web management software to detect computer viruses and intrusion through the internet. Procedures and software are in place to monitor the network and server utilization that will report any attacks or overloaded segment of the network.

### **SERVER ROOM ACCESS**

Access to the server room is restricted and it is the responsibility of the network administrator to direct.

## **OTHER COMPUTER RISK REDUCTION**

**Fire Risk:** The risk of fire in the server room and computer rooms in NIMASA has been reduced by;

- Storage planning portable fire extinguishers
- Training and equipping computer operations personnel to take
- Immediate action against incipient and relatively insignificant fires
- Installing a building fire detection system with an alarm system tied to the authority fire alarm system. Etc

### **2.10 INFORMATION TECHNOLOGY AND GLOBALISATION**

Information technology (DR Adenike) I.T is a phrase which signifies “information age or evolution” which in turn connotes the “GLOBALIZATION”.

According to DR Fred Kemp (1995),

The globalization of the business in the world has been prospering over several years and continues to grow as the world advances in the age of information technology. The globalization of business refers to the increase in trade of goods and services worldwide. This in turn, leads to increased investment and competition. Therefore, because of the tremendous growth in the globalization of business, it is becoming a very lucrative and viable field. This globalization has significant implications to all the countries of the world, specifically for developing countries that are far from the centres of world capital.

Globalization by Jost Debnk (1993) a process of denationalization of clusters of political, technological, economical, and social activities and internationalization, in other hand as co-operative activities of national actor or

private, on a level beyond the nation-state but in the last resort under its control. At the heart of the global financial systems are advanced telecommunications and information processing technologies that have provided the very volume and speed of transaction capabilities that make the system so influential. Similarly (Rossegger 1986, Boskin 1992). “the new global information technology has facilitated the globalization of capital flows”.

### **PROMOTING COMPETITION**

Information technology and information services markets have flourished in the past decades in the developed nations of the world. The high competitive computer equipment, software and networking industries are among the most dynamic in global markets, providing users with steadily increasing computer power and functionality and further stimulating demand for more advanced integrated capabilities. The information service industry has expanded as a barrier to cross-border trade and investment. However, the OECD study further revealed that the quality of service had improved simultaneously with the implementation of competition. The intergovernmental international telecommunications satellite (Intelsat) and international mobile satellite (Inmarsat) organizations now face competition from several separate satellite systems, in providing the required service and because of this competition Intelsat and Inmarsat are considering reforms. The more competitive an information and telecommunication market, the more will be its interaction with other markets and participation in the global market. To this end, Nigeria needs to work constructively to remove barriers to competition in telecommunication technology, and information services markets.

## **PROVIDING OPEN ACCESS**

It is the responsibility of government to ensure that all information service providers have access to facilities, networks and network services on a non-discriminatory and low cost basis. Maximized consumer choice among diverse sources of information should be the primary objectives government should avoid attempts to predict the information resources requirement of the citizens. Improving has direct social and economic benefits. The ability to generate, exchange, and use information, technology, and ideas are central to economic growth and development; increased competitiveness in a range of industries; and the improvement of the quality of life.

## **CHAPTER THREE**

### **3.0 METHODOLOGY OF RESEARCH**

According to Ezejekwe and ogowo (2001), research is a scholarly or scientific study as well as a diligent investigation or inquiry in seeking fact principles. It is pure practical and a midway of executing a research work. Research methodology is the scientific approach adopted by the researcher in gathering data. The research work is aimed at sustainability index of I.T application in maritime industry which will focus on NIMASA as its case study. The approach for research methodology will be on primary/ secondary data.

#### **3.1 TYPES OF DATA**

There are two basic types of data; that is

- PRIMARY DATA
- SECONDARY DATA

##### **3.1.1 PRIMARY DATA**

The primary source of data is to be adopted comprehensively in this research. A questionnaire is designed and spread across the units/Department in NIMASA. This questionnaire is filled ticked and accordingly but where filling it becomes almost impossible, interview or personal interaction is used.

### **3.1.2 SECONDARY DATA**

This research is maiden and may not constitute secondary data as it proves impossible and unreliable to lay hand on authentic information or journals etc. only internet results were used as a secondary data.

### **3.2 RESEARCH INSTRUMENT**

Research instrument refers to the instrument used in collecting the data such as paper, pencil, pen ruler etc. However the instructions are okay.

### **3.3 RESEARCH DESIGN**

This is a plan on how to source the research information and the manner it is to be presented systematically. Using the questionnaire to select the answer, analyzed on a table and give interpretation to the value which is gotten from the mathematics approach in chapter 4 (four).

### **3.4 POPULATION OF STUDY**

The hypothesis is on the subject matter of the project work is 100 persons cutting across units/Departments in NIMASA believes to cover this number because they are insiders.

### **3.4 RESEARCH HYPOTHESIS**

The hypothesis is on the subject matter of the project which is application of I.T for sustainable index in maritime industry. NIMASA as the case study. As reforms are going on in the agency, there is much need to incorporate I.T development as a full programme so as grab all the opportunities in the e-world or e-market. This research work will try to a solution to the agency as to properly find a place in the maritime world. It is hypothesized that information technology application in the maritime industry to achieve a sustainable index, a lot of indicators must be evaluated. Especially as ways and measures have been designed and put in place in order to improve I.T standard in NIMASA (the case study of research). Ways to improving them and adoption of new approach must have to be followed. This research will examine and provide possible solutions on how sustainability will be implemented.

### **3.6 TECHNIQUE OF DATA ANALYSIS**

There is no single research method that can be suitable for all manners of research. The method used in any research is usually determined by the nature of the research and in fact the purpose of study. The result of the questionnaire was analyzed by the use of tables. Simple percentage discussed and interpreted. To source for significant change to a better I.T application in NIMASA, the hypothesis of null and non – null values will be calculated using Z- distribution method of difference means.

### **3.7 RESEARCH SPECIFIC METHODOLOGY**

Writing a project of this nature involves the reliance on a various methods in order to have a richer understanding of the problems. This is particularly important because different research methods focus on different aspects of reality. (Mingers, 2001)

Two main classes of research methods have been identified. Quantitative research methods associated with measuring things on numeric scales and qualitative methods which concerns itself with increasing understanding of a substantive area, rather than producing an explanation for it.(Berndtsson et al, 2002). Fielding and Schreiner (2001), Yin (2002), and Berndtsson et al(2002) also classified research into two – qualitative and quantitative methods. Quantitative research methods are associated with measuring things on numeric scales.

According to Berndtsson et al. (2002) “quantitative research methods stem from the natural sciences and are concerned with understanding ‘how something is constructed/built/works’”. Though some scholars have perceived qualitative and quantitative approaches as incompatible (Lincoln & Gobi, 1985; Schwandt, 1989)

#### **3.7.1 Qualitative Research Method**

Berndtsson et al stated that qualitative research methods are “primarily concerned with increasing understanding of a substantive area, rather than producing an explanation for it. (Berndtsson et al, 2002). Interpretive or

qualitative approach is a “way to gain insights through discovering meanings by improving our comprehension of the whole.”(Neil, 2003). It can also be defined as “any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification”.(Strauss and Corbin,1990).

A qualitative research method helped researchers understand people and the social contexts within which they live and does not have a predefined method of conducting any research. According to Myers (2002), “the ultimate aim of qualitative research is to offer a perspective of a situation and provide well written research report that reflects the researcher’s ability to illustrate or describe the corresponding phenomenon. One of the greatest strengths of the qualitative approach is the richness and depth of explorations and descriptions”.

Yin (2002), Martin and Turner (1986), Myers (1999) and Gay (1996), identified case study, grounded theory, phenomenology, ethnography, and historical research as the major types of qualitative research methods.

A major criticism of the qualitative approach is that, it describes the world of human thoughts hence; researches find it impossible to escape subjective experience. This is due to due to the fact that, understanding human experiences requires a lot of commitment in time and dedication to process especially where the research being undertaken is time constrained. (Neil, 2003). Furthermore, findings using qualitative approach can not be extended

to wide population with the same degree of certainty as using quantitative approach.

However, this project will adopt the case study approach is commonly used in information systems. This is due to the fact that the object in information systems in organisation is the bedrock of the study, and “interest has shifted to organisational rather than technical issues”. (Benbasat et al, 1987). The case study approach and the techniques for collecting and analysing the data shall be discussed in the next session.

### **3.7.2 CASE STUDY RESEARCH METHOD**

There are numerous definitions of case study as there are many scholars. Yin defined case study as an “empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used. (Yin, 1984:p.23)

Case study is a term that is closely associated with research in social sciences. Cornford and Smithson (1996) defines case study as “in-depth exploration of one situation”. It involves investigating a particular situation, problem, company or group of companies through means like interviews, and observation. Berndtsson et al (2002) opined that case study should attempt to “generalize from the specific details of the examined setting by attempting to characterize the situation for which the studied organization is typical”.

The case study approach has been seen as appropriate to individual research as it gives an opportunity for one aspect of a problem to be studied to a reasonable extent within a restricted time scale. This point is relevant to this project as the time available might not permit an in-depth study of the subject matter as a whole. Consequently, this indicates that case study research can be used to set the scope of a project. (Coombes, 2001).

Critics of the case study approach have questioned the extent to which its findings can be generalised among other members in its class (Denscombe (1998). Other critics have questioned the value of the study of a single event. In response to the criticisms questioning of the generalisation of case study findings, Yin (1994) suggests that findings from case studies can be generalised among members of a class or group with common characteristics.

Bell (1999) justifies the study of single event in her work, which points out that “some events cannot be artificially generated”. In such situations, a case study based on that event will be appropriate.

“...good case studies are difficult to do. The problem is that we have little ways of screening or testing for an investigator’s ability to do good case studies.” (Yin, 2003 p. 11) It is believed that case study method generates great deal of subjective data that must be sift, analyse and interpret to produce meaningful, accurate and fair conclusions.(Dawson, 2005).

Despite criticisms of the case study approach, Yin (2003) suggests three conditions that may justify or determine the quality of a good case study research. These are:

The type of research question – the case study approach is suitable when “why” or “how” questions are been asked.

The degree of control the researcher has over the actual events

The focus on contemporary as opposed to historical phenomena

## CHAPTER FOUR

### 4.0 DATA PRESENTATION ANALYSIS AND INTERPRETATION

Twenty five [25] questionnaire were issued-out, only 20 were duly completed and returned, however out of 20 questionnaires returned some columns left un-filled or recommended omitted. In the section “A”, question relating to respondents bio-statistical background were in the following categories’ SEX, marital status. Department /unit and number of years spent in NIMASA. However in section “B”, total of (10) ten questions asked and corresponded percent of response received shall be presented and analyzed quantitatively & qualitatively. In section “C”, analytical questions to benchmark the appraisal of I-T application and its subsequent “D” section.

Finally, the researcher having a wide scope of indicators behaviour, in ascertaining exact hypothesis for sustainability of I.T application in maritime industry: shall consciously test the null of hypothesis using Z-distribution model of defferent means after the quantitative statistical representation on tables are analyzed and interpreted. This shall proffer solution to the research

#### 4.1 DATA ANALYSIS

The analysis of questionnaires administered and those dully completed and returned are shown below.

## Method of data Analysis

The following method were used in data analysis for the purpose of efficiency in addressing the research questions.

- (1) Simple percentage method of analysing data.
- (2) Bar chart.
- (3) Pie chart.
- (4) Critical Z-distribution test.

**TABLE 4.1**

TOTAL NO OF FORMS ISSUED	ADMINISTERED NUMBER RETURNED	PERCENTAGE RETURNED
20	20	80%

Calculation of % of questionnaire returned  $20/25 * 100/1 = 80\%$

Out of the total 25 questionnaire, 20 that were returned represent 80%.

However, it shows on appreciable number of data.

We will look at the test questions respectively.

### 4.2 RESEARCH QUESTION 1

Do maritime industries require information technology (I.T).application? The response is shown on the stat- table below.

**TABLE 4.2**

RESPONDENT	FREQUENCY	PERCENTAGE %
YES	20	100%
NO	—	—
TOTAL	20	100%

A good analyst could see from the table that I.T application in a maritime industry is vital. out of 20 respondents that completed and returned their questionnaires representing 100% agreed with the question (QED).

#### 4.3 RESEARCH QUESTION 2

Has NIMASA consolidated information technology and operation of it? The responses result are shown below

**TABLE 4.3**

RESPONDENT	FREQUENCY	PERCENTAGE%
YES	9	45%
NO	11	55%
TOTAL	20	100%

The total response shows that 45% of the respondents agreed that Nimasa has consolidate I.T its operation white 55% been on a higher side strongly disagreed.(55 -45-10%)

#### 4.4 RESEARCH QUESTION 3

Are you computer literate?

The responses are shows below

**TABLE 4.4**

REPODENT	FREQUENCY	PERCENTAGE%
YES	17	85%
NO	3	15.01%
TOTAL	20	100%

$$17/20 * 100/1 = 85\% > 3/20 * 100/1 = 15\%$$

The total shows that 85% of the respondents are computer literate while 15% are not computer literate. For sustainability of its application in maritime industry, all concerned ought to be literate of the computer. Well 85% is appreciable high.

**TABLE 4.5**

TOTAL NUMBER ISSUED OUT	ADMINISTERED NUMBER RETURNED	PERCENTAGE%
25	20	80%

Calculation of % questionnaire returned

$$20/25 \times 100/1 = 80\%$$

Out of the total 25 questionnaires, 20 that were returned represent 80%. However it shows an appreciable number of data.

We will look at the test questions respectively.

#### 4.5 RESEARCH QUESTION 4

Do maritime industries require information technology (i.t) application?

The response is shown on the table below.

**TABLE 4.6**

RESPONDENT	FREQUENCY	PERCENTAGE%
YES	20	100%
NO	-	-
TOTAL	20	100%

A good analyst could see from the table the i.t application in a maritime industry is vital. Out of 20 respondents that completed and returned their questionnaires representing 100%. Agreed with the question (QED).

#### 4.6 RESEARCH QUESTION 5

Are you computer literate?

The responses are shown below.

**TABLE 4.7**

RESPONDENT	FREQUENT	PERCENTAGE%
YES	17	85.0%
NO	3	15.0%
TOTAL	20	100%

The total shows that 85% of the respondents are not computer literate. For sustainability of I.T application in maritime industry, all concerned ought to be literate of the computer. Well 85% is appreciable high.

#### 4.7 RESEARCH QUESTION 6

Were you orientated by the agency on I-T usage?

The responses are shown below?

**TABLE 4.8**

RESPONDENT	FREQUENCY	PERCENTAGE
YES	8	42.1
NO	11	57.9
TOTAL	19	100%

$8/19 \times 100 = 42.1\%$  >  $11/19 \times 100 = 57.89\%$

This total shows that 42.1 of the respondent were given orientation by agency on I-T usage & importance in the marine industry. While 57.9 strongly disagreed with the question meaning a high % were not given the orientation.

#### 4.8 RESEARCH QUESTION 7

Has I-T Application reduce paper work in your unit/ department.

The response is shown below.

**TABLE 4.9**

RESPONDENT	FREQUENTLY	PERCENTAGE
YES	10	50%
NO	10	50%
TOTAL	20	100%

$$10/20 \times 100 = 50$$

The total shows that 50% of the respondent agreed that I.T application has reduced paperwork in their unit/department, which the other 50% strongly disagree never to have seen the effect. However, database system /environment on real application ought to reduce paperwork drastically.

#### 4.9 RESEARCH QUESTION 8

With the aid of I.T. is staff relation/ teamwork improve effectively?

The responses are shown below.

**TABLE 4.10**

RESPONDENT	FREQUENTLY	PERCENTAGE%
YES	15	78.94%
NO	4	21.05%
TOTAL	19	100%

$$15/19 \times 100 = 78.94; 4/19 \times 100 = 21.05$$

Similarly out the total respondents 78.94% agree with the research questionnaires while 21.5% respondents disagrees

#### 4.10 RESEARCH QUESTION 9

Do you think slow approach to I-T development is responsible in agency's failure to meet international standard.

The responses are shown below.

**TABLE 4.11**

RESPONDENT	FREQUENTLY	PERCENTAGE%
YES	13	76.47%
NO	4	23.53%
TOTAL	17	100%

$13/17 \times 100/1 = 76.76$ ;  $4/17 \times 100/1 = 23.25$ .

The above table shows that out of the total respondent 76.47% agreed with the above research question. While 23% disagreed; this may be relevant subsequent upon other indicators of performance to match international standard which are below average in the maritime industry application with the country.

#### **4.11 RESEARCH QUESTION 10**

Has I.T application in NIMASA made any meaningful development both in the agency and in maritime industry generally?

**TABLE 4.12**

RESPONDENT	FREQUENCY	PERCENTAGE%
YES	19	95%
NO	1	5%
TOTAL	20	100%

$19/20 \times 100/1 = 95$ ;  $1/20 \times 100/25 = 5$

The table shows that out of the 20 respondents 95% agreed that I.T application in NIMASA (the case study of the research) has brought meaningful development both in the agency and in maritime industry generally. While 5% not see reason with the answer and therefore disagreed.

#### 4.12 RESEARCH QUESTION 11

Are there problems surrounding/ encountered in I-T development in the agency's?

The responses are shown below.

**TABLE 4.13**

RESPONDENT	FREQUENCY	PERCENTAGE%
YES	20	100%
NO	-	-
TOTAL	20	100%

$20/20 \times 100\%$

The above table that all the respondent agreed that problems were surrounding the development of I.T and problems encountered as well. How it is a true test.

#### 4.13 RESEARCH QUESTION 12

Are there ways of improving the problems?

The responses are:

**TABLE 4.14**

RESPONDENT	FREQUENCY	PERCENTAGE%
YES	19	95%
NO	1	5%
TOTAL	20	100%

$19/20 \times 100/1=$ ;  $1/2 \times 100/1=5\%$

The shows that out of the 20 respondent 95% agreed that I-T development challenges/problem could be improve; while 5% disagreed well to their best of knowledge. Problems have solution and it is basis for every research work.

Similarly, a through analysis of the general findings will be discussed extensively.

## 2. PIE CHART ANALYSIS

Using the formula,

$$\frac{\text{Response}}{\text{Total}} \times \frac{360}{1}$$

### IN RESEARCH QUESTION 1

DO MARITIME Industries require information technology I.T application ?

Yes

$$\frac{20}{20} \times \frac{360}{1}$$

### RESEARCH QUESTION 2

Has NIMASA consolidated information technology and operation of IT?

$$\text{For yes} = \frac{9}{20} \times \frac{360}{1} = 162$$

$$\text{For no} = \frac{11}{20} \times \frac{360}{1} = 84$$

### RESEARCH QUESTION 3: Are you computer literate ?

$$\text{For yes} = \frac{17}{20} \times \frac{360}{1} = 306$$

$$\text{For no} = \frac{11}{20} \times \frac{360}{1} = 84$$

**RESEARCH QUESTION 4:** Do maritime industries requires information technology (I.T) application ?

$$\text{For yes} = \frac{20}{20} \times \frac{360}{1} = 360$$

**RESEARCH QUESTION 5:** Has I.T. application reduce paper work in your unit/department ?

$$\text{For yes} = \frac{10}{20} \times \frac{360}{1} = 180$$

$$\text{For no} = \frac{10}{20} \times \frac{360}{1} = 180$$

**RESEARCH QUESTION 6:** With the aid of I.T. has the staff relation/teamwork improve effectively?

$$\text{For yes} = \frac{15}{20} \times \frac{360}{1} = 270$$

$$\text{For no} = \frac{4}{20} \times \frac{360}{1} = 72$$

$$\text{Not sure} = \frac{1}{20} \times \frac{360}{1} = 18$$

**RESEARCH QUESTION 7:** Has I.T. Application in NIMASA made any meaningful development both in the agency and in maritime industry generally?

$$\text{For yes} = \frac{19}{20} \times \frac{360}{1} = 342$$

$$\text{For no} = \frac{1}{20} \times \frac{360}{1} = 18$$

**RESEARCH QUESTION 8:** Are there problems, surrounding/encountered in I.T. development in the agency?

$$\text{For yes} = \frac{20}{20} \times \frac{360}{1} = 360$$

$$\text{For no} = \frac{0}{20} \times \frac{360}{1} = 0$$

**RESEARCH QUESTION 9:** Are there ways of reducing the problems?

$$\text{For yes} = \frac{19}{20} \times \frac{360}{1} = 342$$

$$\text{For no} = \frac{1}{20} \times \frac{360}{1} = 18$$

Using the test of the different means the critical z- distribution test for a more accurate and scientific conclusion.

**TABLE 4.15**

<u>RESEARCH QUESTION</u>	<u>YES RESPONSE X1</u>	<u>NO RESPONSE X2</u>
QUE 1	9	11
QUE 2	17	3
QUE 3	8	11
QUE 4	10	10
QUE 5	15	4
QUE 6	13	3
QUE 7	19	1
QUE 8	20	-
QUE 9	19	1
QUE 10		
TOTAL	150	45

Mean for  $x = \frac{\sum x}{n}$   
 $= 150/10$   
 $X1 = 150$

Where n equal to number of yes respondents that agreed with all the test question (research question).

Mean for  $x2 = \frac{\sum x}{N2}$   
 $X2 = 45/8$   
 $X2 = 5.6$ .

Where n equal to number of respondent that strongly disagreed with the research question  $N1 = 10$ ,  $N2 = 8$ .

Since  $n1 + n2 = 30$ , for population is normally distribute using the formula below, we get the standard deviation as

$$S_1^2 = \frac{(x-x)^2}{n-1} \text{ and } S_2 = \frac{(x-x)^2}{n-1}$$

$$S_1^2 = \frac{(X_{11}-X)^2 + (X_{12}-X)^2 + (X_{13}-X)^2 + (X_{14}-X)^2 + (X_{15}-X)^2 + (X_{16}-X)^2 + (X_{17}-X)^2 + (X_{18}-X)^2 + (X_{19}-X)^2 + (X_{20}-X)^2}{n-1}$$

$$S_1^2 = \frac{(20-15)^2 + (9-15)^2 + (17-15)^2 + (8-15)^2 + (15-15)^2 + (13-15)^2 + (19-15)^2 + (20+15)^2 + (19+15)^2}{10-1}$$

$$S_1^2 = \frac{(25+36+4+49+25+4+16+25+16)}{9}$$

(Variance)

$$= \frac{200}{9}$$

Standard deviation  $S_1 = \sqrt{22.2}$

$$S_1 = 4.71$$

$$S_2^2 = \frac{(x-x)^2}{n-1}$$

$$\frac{(X_{21}-X)^2 + (X_{22}-X)^2 + (X_{23}-X)^2 + (X_{25}-X)^2 + (X_{26}-X)^2 + (X_{27}-X)^2 + (X_{28}-X)^2 + (X_{29}-X)^2 + (X_{20}-X)^2}{n_2-1}$$

$$n_2 - 1$$

$$(11-5.6) + (3-5.6) + (11-5.6) + (10-5.6) + (4-5.6) + (3-5.6) + (1-5.6) + (1-5.6) +$$

$$S_2^2 = \frac{\quad}{8-1}$$

$$S_2^2 = \frac{(29.16 + 6.76 + 29.16 + 19.36 + 2.56 + 6.76 + 21.16 + 21.16)}{7}$$

$$= \frac{136.08}{7}$$

$$\text{Variance } (S_2^2) = 19.44$$

Standard deviation :

$$S_2 = \sqrt{19.44}$$

$$S_2 = 4.41$$

Formula for critical Z distribution

$$\frac{X_1 - X_2}{S_{X_1 - X_2}}$$

$$S_{X_1 - X_2}$$

**Note:**

H0 = null Hypothesis

H1 = Alternative hypothesis

H0 = There is a significant change in I.T application for a Sustainable index in maritime industry

H1 = There is no significant change in I.T application for a Sustainable index in maritime industry

The level of significance is

$$H_0 = U_1 = U_2$$

$$H_1 = U_1 = U_2$$

#### **4.2.1 RESEARCH FINDINGS**

Section c of the questionnaire is a joint to the section 'D'. At the summary of the result, 20 questionnaire were filled and returned in which 10 respondents

agreed that communication with client in the maritime industry is mostly by telephone, 6 said by e-mail while 4 by instant messenger.

However this result is poor for networked environment where application of I.T is effective. For sustainability of I-T in this industry, at least an average of '19' out of 20 channel of communication should be by e-mail or instant messenger. Staff should be accessed on-line with their client within '12' working hours on line, which describe an active internet connection. A review of I.T developed nation shows high percentage index of access.

Equally voluminous documents used in transaction between staff and clients in the sector registered a poor result, Whereby courier services are still used as the major mode of transporting voluminous document; instead of e-mail or fax. None of the respondents agreed that faxing of documents should not be used.

Similarly in the unit/Department predominant service type. '7' respondents agreed the internet service is used frequently while '13' said through database and none assigned for fax. The response is absolutely encouraging for an effective-Digitize environment. The use of e-mail service in business for communication or instant message where a client interacts with other online reduce cost and make communication reliable.

There is risk of transporting documents through courier services and e-mail can be a substitute.

Time is consciously managed in an I.T environment, (Dr NIKAS) Electronic service and application in maritime industry at business forum).

Utilizing the internet as means of gathering and disseminating information among staff and managements shareholders and outsiders in general and the utility of the intranet is also used for the same purpose by staff within the maritime organization (Alter 200:6).

REVELATION FORM (SECTION D)

S/N	STRATEGIC OPTION	HIGH	%	AVERAGE	%	LOW	%	
1	How would you rate I.T application in maritime industry	4	20%	11	55%	5	25%	$4/20 \times 100/1 = 20\%$ , $11/20 \times 100/1 = 55\%$ , $5/20 \times 100/1 = 25\%$
2	How would you rate training on I.T by Agency in maritime industry use		30%	6	30%	14	70%	$6/20 \times 100/1 = 30\%$ , $14/20 \times 100/1 = 70\%$ ,
3	How would you appraisal I.T development in NIMASA from inception as to maritime application	2	10%	12	60%	6	30%	$2/20 \times 100/1 = 10\%$ , $12/20 \times 100/1 = 60\%$ , $6/20 \times 100/1 = 30\%$
4	How would you appraise I.T unit in NIMASA in development of I.T to enhance maritime industry.	3	15%	15	75%	2	10%	$3/20 \times 100/1 = 15\%$ , $15/20 \times 100/1 = 75\%$ , $2/20 \times 100/1 = 10\%$

(Soiree, Recorders Questionnaire Result)

#### 4.2.2 RESEARCH FINDINGS

The above table (Revelation for) shows that a very significant percentage of respondents agreed that application of I.T in maritime industry in Nigeria is very poor and requires quick improvement in-order to chatch-up the eluding with Average or low. The effort to sustain the application is enormous and challenging, only if basic infrastructure adoption of new/ strategies investment in I.T appropriation of more resources to maintain and run, and most importantly the implementation of I.T basec policies is addressed.

In question '1' section 'D' 20% of the total respondents would rate I.T application in maritime industry in Nigeria 'High' An average of 55% by respondents and the corresponding respondents rated its application as low as25% similarly, if of Average of 55%, locks merit which may be generated by poor government attention in its Agency building and sustainability.

Out of the total 20, respondents 10% would appraise application of I.T NIMASA since its inception High. The response is too poor a sustainable growth. 60% rated it at Average while 30% of respondents a greed that I.T application in the industry is low. tracing the survival of industrial growth New approach' grow geometrically slow if enough attention is not given.

Finally 15% out of 20 respondents rated I.T Unit in the organisation High in their efforts to make I.T application / development standard. 75% say at average while the corresponding 10% rated the test question answer low.

Nevertheless, individuals were asked to contribute by suggestion ways I.T can be sustained in maritime industry? I have some of their contributions as follows: first, responded in information technology who has spent 5yrs in NIMASA said

- (a) Deployment of infrastructure and capacity building.
- (b) Organising training and workshop and
- (c) Enforcing use of computers and infrastructure in all areas will automatically give sustainable index in I.T application in the Maritime industry.

**Secondly**, another respondent who has spent 20 yrs in NIMASA said in his own view:-

- (a) Providing all employees with computers towards computerization of maritime operations
- (b) By providing internet services to all senior staff in the organization.
- (c) Continuous ICT training is the answer.

**Thirdly**, the respondent who has equally spent 6 years in internal audit of NIMASA that:-

- a) The agency should fully computerize all its operation, provide a V-sat and adequate staff training on IT matters.

**Fourthly**, another staff that has spent 15 years in shipping development department in the agency said,

- a) We must go international in terms of our operations
- b) Staff must be equipped to meet the required standard of expectations.
- c) Training and retaining of staff must be re-occurring event and international training should be priority.
- d) Trim- data base should operated our IT staff instead of consultant.
- e) We must have focus for achieving results/ no amount too small in achieving I.T applications

Another staff in research and planning department who has spent 10 years in the agency said continuously training of all staff of the agency and update of latest IT in the world market into function in the sector will bring a revolutionary change

Critical Z (0.05) = + 1.96, z (0.25) = +1.96

$$S^2 = \frac{(N_1 - 1)S_1^2 + (N_2 - 1)S_2^2}{N_1 + N_2 - 2}$$

$$S^2 = \frac{(10-1)(4.71)^2 + (8-1)(4.41)^2}{10 + 8 - 1}$$

$$S^2 = \frac{(9)(22.81) + (7)(19.45)}{10 + 8 - 1}$$

$$S^2 = \frac{199.62 + 136.1}{17}$$

17

$S^2 = 19.7$  and

3 s

$$S^2 = \frac{1}{n_1} + \frac{1}{n_2}$$

2 2

$$= \frac{19.7}{10} + \frac{19.7}{8} = \frac{388.09}{10} \times \frac{388.09}{8}$$

$$= \sqrt{38.8+48.5}$$

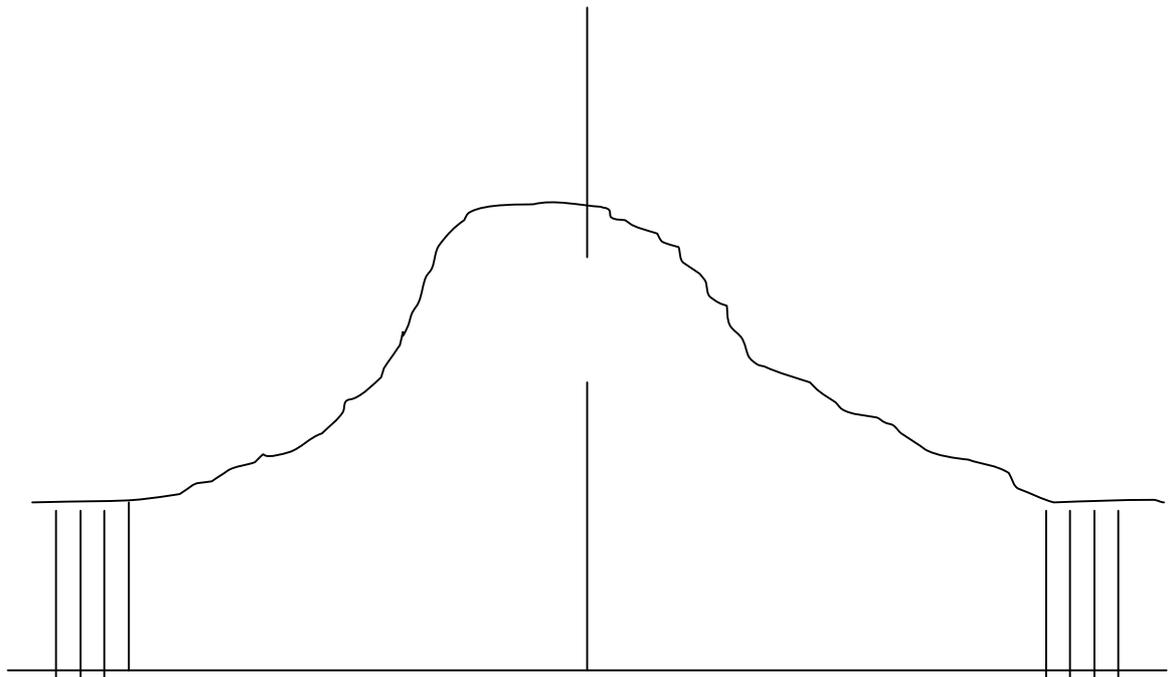
$$= \sqrt{87.3} = 9.3$$

$$Z = \frac{X1 - X2}{S \sqrt{X1 - X2}} = \frac{15 - 5.6}{9.3}$$

$$\frac{9.4}{9.3} = 1.01$$

The  $\alpha = 0.05$ ,  $\alpha/2 = 0.025$ , hence values = 1.96 as shown below since Z (0.25) (1.01) = 1.96 the null hypothesis shows that 1.01 is less than 1.96 fall on the acceptance region on the right hand side; we accept the null hypothesis and conclude that there is a significant change in I.T application for maritime industry.

However the change is relatively small between (1.01 < 1.96). The Decision Rule:



-1.96  
01.96

020.01

Finally, for clearer interpretation we shall analyze the section 'C' and 'D' of the questionnaire below before analyzing and drawing conclusion

## CHAPTER FIVE

### SUMMARY OF THE MAJOR FINDINGS, CONCLUSION AND RECOMMENDATIONS

#### 5.1 SUMMARY OF MAJOR FINDINGS

This research work has analysed the data collected through primary and secondary sources. Also, these data has been interpreted in the previous chapter. This chapter will summarize the major finding made on the course of this research, and present some conclusions and recommendations for further research work. Hence, the following summaries were made:-

- (a) Nigerian Maritime Administration and Safety Agency (NIMASA) require a new and updated hardware and software, to replace the obsolete one in order to meet today's challenges.
- (b) Generally, the staff of the Agency requires extensive training in I.T. so that the knowledge gap between the staff and what is obtainable in the industry can be bridged.
- (c) The I.T unit is not adequately financed by the Agency in terms of procuring enough computer system for the staff ad there is the need to provide adequate computer system for all the saff.
- (d) Staff skills in computer operation need to be improved.
- (e) It shows that the application of I.T. in maritime industry in low and it requires improvement in order to meet the international standard,

#### 5.2 Conclusion

The evaluation of the NIMASA I.T from the point of view of a staff in the unit has shown its readiness to improve the utilization of computers to all level in the Agency.

The issue of accessibility, usability and platform interoperability as pointed out by the respondents are issues that can be addressed once a proper framework is put in place. This should be expected because it is a reflection of the general level of information technology implementation in a government establishment.

The project has shown that, some of the equipments are not operational and there is the need to replace them.

Furthermore, this research is also aimed at providing an insight into what the management of (NIMASA) should consider when improving I.T department. However, a further research can be carried out by the relevant authorities with a view to understanding the different stages of I.T application in all government establishments in order to developing a model that will be compatible with the Nigerian societal norms while trying to take the aspect that centres on general accessibility and usability standards.

Furthermore, to attain the other level of I.T in government, the socio-economic and organizational barriers within the public sector in particular and the Nigerian society in general, will have to be addressed alongside technological implementations. These barriers include lack of technical staff, funding, and the digital divide amongst the various level of government.

### **5.3 Limitations**

This research work was hampered by a lot of factors. First, during the course of the work, the existing information on I.T was easily available. This became a problem because it was practically impossible to evaluate a non-existent information. It took a lot of appeal before one can get access to some files.

## 5.4 Recommendation

In view of the issues raised, this work recommends the following:

- ◆ The redesign of the official of channeling information should taken into consideration, the issues of accessibility, usability, interactivity and in conformance with international standard.
- ◆ The training of all staff on the challenges of accepting changes that information technology will bring. This is relevant because it is very difficult to introduce new technology in government establishments particularly amongst the management staff.
- ◆ The staff also needs to be trained in areas of internet usage, this will make them more interactive and to reduce the dependent on manual processing of information to ease the transfer of information to the net.
- ◆ The agency should work closely with National Information Technology Development Agency (NITDA) in order to understand the benchmark for measuring the website development to ensure conformity.
- ◆ The issue of security of its internet/website should never be compromised since the site will hold personal data of individuals to guide against fraudulent activities.
- ◆ The agency should consider professionalism, integrity and expertise in the selection of its information consultants.
- ◆ Furthermore, there is the need for the Federal Government to intensify the full implementation of the National IT Policy by giving more power to the National Information Technology Development Agency (NITDA) in implementing and ensuring that IT policy are implemented. (Bregar et al, 2004) Also, there is the urgent need for the establishment of a benchmark for measuring the website development so that standards can be entrenched.
- ◆ A detail risk analysis of the proposed development should be carefully documented and alternative arrangement put in place to avoid any problem which might occur.

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