**A TECHNICAL REPORT ON STUDENT WORK EXPERIENCE SCHEME (SIWES) TRAINING PERIOD BETWEEN SEPTEMBER TO DECEMBER 2015.**

**AT**

**FEDERAL MINISTRY OF INDUSTRY, TRADE AND INVESTMENT**

**(WEIGHTS AND MEASURES DEPARTMENT)**

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**BY**

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**CHAPTER 1**

**INTRODUCTION**

Student Industrial Work Experience Schemewas established by Industrial Training Fund**,** (Governmental Agency) in 1973 to solve the problem of lack of adequate practical skill(s) preparatory for employment in industries by Nigerian graduates of tertiary institutions.

The Scheme is set to expose students to industry based skills that are necessary for their smooth transition from the four walls of their lecture halls to the labour market. It provides students of tertiary institutions the opportunity of being familiarized and exposed to the needed experience in handling machinery and equipments which are usually not available in the educational institutions. It also helps them to create connections with the labour force and to have work experience.

Participation in SIWES has become a necessary pre-requisite for the award of Diploma and Degree Certificates in specific disciplines in most institutions of higher learning in the country, in accordance with the education policy of government.

**Operators and Bodies Involved in SIWES Programmes:**

The Industrial Training Fund, the coordinating agencies (National University Commission, National Council for College of Education, National Board for Technical Education) and the employers of institutions are the bodies involved in SIWES programmes.

**Beneficiaries and Participants:**

The participants of SIWES are the undergraduate students of the following courses: Agriculture, Engineering, Technology, Environmental, Science, Education, Medical Science, Pure Sciences and Applied Sciences in Polytechnics, Universities and Colleges.

**Duration:**

The SIWES duration for Polytechnics and Colleges of Education is four months, and six months for the Universities.

**BACKGROUND OF SIWES**

The Industrial Training Fund (ITF) was established in 1971 and has consistently within the context of its enabling laws, i.e. the decree 47 of 1971. The objective for which the Fund was established has been pursued vigorously and efficaciously in the three decades of its existence, the Industrial Training Fund (ITF) has not only raised training consciousness in the economy, but has also helped in generating a corps of skilled indigenous manpower which has been manning and managing various sectors of the national economy.

Over the years, pursuant to its statutory responsibility, the Industrial Training Fund (ITF) has expanded its structures, developed training programmes, reviewed its strategies, operations and services in order to meet the expanding, and changing demands for skilled manpower in the economy. Beginning as a Parastatal "B" in 1971, headed by a Director, the Industrial Training Fund became a Parastatal "A" in 1981, with a Director-General as the Chief Executive under the power of the Ministry of Industry. The Fund has a 13 member Governing Council and operates with 6 Departments and 3 Units at the Headquarters, 27 Area Offices, 2 Skills Training Centres, and a Centre for Industrial Training Excellence.

As part of its responsibilities, the Industrial Training Fund provides Direct Training, Vocational and Apprentice Training, Research and Consultancy Service, Reimbursement of up to 60% Levy paid by employers of labour registered with it, and administers the Students Industrial Work Experience Scheme (SIWES). It also provides human resource development information and training technology service to industry and commerce to enhance their manpower capacity and in-house training delivery effort.

Therefore the success or otherwise of the SIWES depend on the efficiency of the Ministries, ITF, Institutions, employers of labour and the general public involved in articulation and management of the programme. Thus the evaluation of SIWES in tertiary institution in meeting up with the need of the establishment of the programme is necessary.

**OBJECTIVES OF SIWES**

1. To bridge the identified gap and practice of engineering and technology in tertiary institutions.
2. To provide avenue for students in institutions of higher learning to acquire industrial skills and experience applicable to their field of study.
3. To prepare students for post graduation work situation.
4. To expose students to work methods and techniques in handling equipments and machinery that may not be available in educational institutions.
5. To provide opportunity for students apply their knowledge in real work situations and thereby bridging the gap between theory and practice.
6. It ease the transitions from school to labour force and enhance students for later job contacts.
7. To create opportunity for social interaction with different category of students from different institutions thereby encouraging everlasting friendship.
8. To prepare students for future problems and challenges.
9. Enlist and strengthen employers, involvement in the entire educational process.
10. Prepare students for employment in Industry and Commerce.

**CHAPTER 2**

**DESCRIPTION OF PLACE OF ESTABLISHMENT**

Thename of the establishment that I served is Federal Ministry of Industry, Trade & Investment, under the Legal Metrology (Weights and Measures) Department.

The objective of Weights and Measures Department is to look at the metering system of the operators for Accuracy, Equity, Fairness and Conformity. It will take into consideration Internationally acceptable error margin for us to have fair and justice in trading devices use by the operators in Nigeria.

It is a Federal Government Establishment that is concerned with the enforcement of the Weights & Measures Act and the Pre-shipment Inspection Act which are attached to this report.

It is a department in the Federal Ministry of Industry, Trade and Investment, the Ministry is headed by a Minister (which is appointed by the President of the Federation), also a Permanent Secretary, and a Board of Directors.

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| **OBJECTIVES OF THE ESTABLISHMENT**  The objective of the Department of Weights and Measures is to become one of the leading National Metrology in the world as it implements the Weights and Measures Act of the Federal Republic of Nigeria and contributing to the Trade and Investment facilitation drive of the parent Ministry (Federal Ministry of Industry, Trade & Investment) and the realization of the objectives of the programme of the Federal Government of Nigeria.  Furthermore, the Department of Weights and Measures is determined to ensure that all commercial transactions involving measurement are fair, accurate, equity, conformity and legal with a view to protecting the consumers and encouraging competition among businesses.  The duty schedules of the Department of Weights and Measures is reflected in the organogram on page 15, and the specialized capacity building requirements of the department in various fields are as follows;   * Training in various capacity provers and Measurement Equipment in Oil and Gas sector. * Training in Time/Frequency in the Telecommunication Sector. * Training in the Electricity Time/Modules/Token Metering equipment. * Training in water metering equipment. * Re-training of Inspectors in the pre-packed goods and manufacturing sectors Weighing and Measuring devices/equipment * Training in inter-laboratory comparative analysis as it affects mechanical Engineering significant components in metrology. * Senior management training in communication, Records and fundamental (basic) principles of accounting in relation to Internal Generated Revenue. * Training in equipment and laboratory maintenance in Petroleum Training Institute, University of Lagos, University of Ibadan and University of Abuja respectively.   The department is also known as Legal Metrology Department which is the entirety of the Legislative, Administrative and Technical procedures established by the government, or by reference to public authorities, and implemented on their behalf in order to specify and to ensure fairness in a regulatory or contractual manner, the appropriate quality and credibility of measurement related to official Controls, Trade, Engineering, Health, Construction, Safety and the Environment.  Legal Metrology is the modern form of Weights and Measures control, it is the activity through which the government decides to take regulatory action over certain categories of measuring instruments used in industries, trade and institutions (those used for commercial transactions) or over certain measurement procedures (Public Health, Public Safety, Environmental Protection).  For example the use of Legal Metrology by government to control issuance and monitor utilisation of Export Permits for Crude Oil and Gas from Nigeria.  Another example is the restriction of the importation of sunrise cable and some other bad products into the country. |

**LOCATION AND BRIEF HISTORY OF LEGAL METROLOGY DEPARTMENT**

The Establishment is located in Garki Area 1, Abuja Municipal Area Council in Abuja FCT. It has been in existence before the National Independence, but due to restructuring, it is said to be reinstated in 1961. From the beginning of the world, Measurement was recognised as a provider of objective information.

However when used in trade transactions where the measurement process lacked transparency, and there was asymmetry of information between the trader providing the measurements and the trader accepting these measurements (usually the purchaser in retail transactions, the producer in farm produce transactions and the smaller business in commercial transactions) there was considerable scope for uncertainty, disputation, transaction costs and market inefficiency.

These transaction costs can result from concerns about the accuracy of the measurement e.g. short measure, and the consistency of the measurement e.g. paying more than other customers.

**COOPERATE BODIES WORKING WITH THE ESTABLISHMENT**

National Institute of Standards and Technology (NIST), Standard Organisation of Nigeria (SON), Nigerco Nigeria Limited (NNL), Telemetry Nigeria Limited (TNL), Nigerian Communications Commission (NCC), National Agency for Food and Drug Administration and Control (NAFDAC), Consumer Protection Council (CPC), CODEX, National Office For Technology Acquisition & Promotion (NOTAP), Nigerian Electricity Regulatory Commission (NERC), Manufacturers Association Of Nigeria (MAN), National Environmental Standards and Regulations Enforcement Agency (NESREA) etc are some of the organizations involved in carrying out Weights and Measures Act in Nigeria. All these agencies partner with Legal Metrology Department (Federal Ministry of Industry, Trade & Investment) to enforce Weights and Measures Acts. Elaborate details of few of them are as follows;

* **National Institute of Standards and Technology (NIST)**

# This is another agency involved with the Regulation and Enforcement of Weights and Measures in Nigeria. In the realm of electrons and light, the National Institute of Standards and Technology (NIST) provides the standards, develops the instruments, and performs the calibrations necessary to keep both the smallest electronic components and the largest power grids running smoothly and safely. In relations to Electronics and Metrology, NIST developed a project called Power Devices and Thermal Metrology which helps in creating fairness in Measurements and Weights.

The Power Devices and Thermal Metrology Project develop electrical and thermal measurement methods and equipment to support development and application of advanced power semiconductor devices and ICs. The Project performs research enabling integration of advanced power electronics technologies into future energy systems, and supports development of Smart Grid measurement methods and standards for Distributed Generators, Renewable, Storage and Micro grids.

Another advisory role performed by the NIST is in defining new programs for development of advanced power devices in support of DOE and DOD initiatives. Advanced power electronics technologies are becoming critically important to meet the nation's energy and defence priorities such as energy independence, increased capacity and stability/resiliency of the power grid, renewable/clean power generation, electric transportation, and electrification of DOD platforms and systems.

The Energy Independence and Security Act of 2007 assigned NIST "the primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems…"

* **Standards Organisation of Nigeria**

Standards Directorate is the main organ of Standards Organisation of Nigeria (SON) indicated in the SON Act No.56 of 1971 and various amendments thereafter. Its main responsibility is to develop Nigerian Industrial Standards (NIS) in collaboration with relevant stakeholders. It performs the following functions:

1. Administrative Structure
2. Development of National Standards
3. Participation in International Standardization

The directorate is headed by a Director who reports directly to the Director General/Chief Executive (SON). The director manages the activities of the directorate with support of Seven Group Heads who coordinates the activities of the seven technical departments in the Organization. The directorate is also responsible for coordinating SON participation in the activities of International Organization for Standardization (ISO), International Electrochemical Commission (IEC), Codex Alimentraius Commission, Africa Organization for Standardization (ARSO), World Trade Organization (WTO) and Economic Community of West African States (ECOWAS) standards harmonization programme amongst others. The directorate is made up of the following groups and units:

1. Building/Civil Technology Group
2. Chemical Technology Group
3. Electrical/Electronic Group
4. Food Technology Group
5. Information Technology Group
6. Mechanical Technology Group
7. Textile and Leather Technology Group
8. International Standardization and SMEs Desk
9. National Codex Contact Point
10. ARSO and ECOWAS Desk
11. SON Technical Library

These groups serve as the secretariats for elaboration of standards needed by the various sectors under their specialty. The desks are the national contact point for dissemination of information about the related activities to the various stakeholders.

Metrology and Instrumentation is one of the Directorates in Standards Organisation of Nigeria (SON) located in the city of Lagos. The function of the Metrology and Instrumentation Directorate is to establish, develop and maintain a National Primary Metrology Laboratory for Nigeria and to provide Calibration Services for Industries, Government Organizations, Research Institutes, Private Companies and other Bodies and Individuals.

It is also the responsibility of the Directorate to advise the Government Agencies and the Private Sector on issues concerning Metrology and Instrumentation and to render consultancy services to clients on behalf of SON.

The Metrology Section of SON undertakes Scientific and Industrial Metrology and renders calibration services in Temperature, Mass, Pressure, Volume, Dimension and Electrical Electronics.

The Instrumentation section of the directorate has the Instrument Support Service Centre (ISSC) which has the responsibility for maintaining laboratory equipment for SON and customers. The ISSC currently offers maintenance and repair services covering:

1. Electrical/Electronic testing equipment
2. Civil and Mechanical engineering testing equipment
3. Chemical technology testing/analytical equipment
4. Food testing/analytical equipment
5. Textile testing equipment

**VARIOUS SECTIONS AND UNITS IN THE ESTABLISHMENT**

* Director’s office
* Administrative office
* Training S Statistical MD Section
* Oil and Gas Section
* Non Oil Section
* Laboratory Unit
* Staff Training Unit
* Engineering & Related Services Unit
* Manufactured and Packaged Goods Unit
* Upstream and Downstream Operations Unit

**CHAPTER 3**

**CONTRIBUTIONS TO THE ESTABLISHMENT**

The following are my contributions to the Establishment.

* I designed a action sheet for the department due to lack of new file jackets in the office which delays the work to be done. I made a lot of copies available in all the offices and units in the establishment. *(See page 23 for reverence)*
* I also devise a means of sending documents, information, circulars and memos through the use of a scanning machine and a internet connected computer system to all state offices instead of the former way of sending it through telephone calls and courier services. For this to be achieved, I collect the email addresses of all staffs in the organisation (both state offices and headquarters).

**OBSERVATIONS**

The following are my observations and knowledge gained in the Establishment.

* I observed that the Weights and Measures cut across all aspects of life.
* Ialsoobserved thatthe Weights and Measures Nigeria is connected to the International body of Legal Metrology and is guided by the Weights and Measures Act. *(see appendix attached)*
* I observed that the Department is divided into three (3) sections and seven (7) units which are headed by a Deputy Director and Assistant Director respectively. *(See the organogram on page 15 for reference)*
* Furthermore, I observed that despite someone’s engineering knowledge, there is a need for Solid Administrative knowledge for efficiency in duties.
* Another observation of mine is that cooperate involvement of all members of staff is needed in achieving success in an establishment or organisation.

**DESCRIPTION OF EXPERIENCE IN THE ESTABLISHMENT**

In the place of attachment, I learnt a lot about administrative procedures, the relationships between various organisations and the government.

I also learnt about the role of government in policy making and enforcement in the industry and trade of the nation.

Another experience is based on the civil service hierarchy and manners of doing things, I witness the promotion of some officers and the filing of some officers query letters; both is based on their attitudes and activities at work. During the period of my stay in the place of attachment, I was able to meet a lot of influential people; directors of various departments, state coordinators, top government officials and some other charm-circle in the society.

In my quest for building solid relationship, as one of the goals of SIWES programme, I encountered a lot of challenges in the area of recognition and acceptance. Sometimes, my boss will send me to a office and I will be treated as an errand boy or sometimes I will be kept standing for a long time or throughout my stay in the office.

Sometimes in these situations, I will feel annihilated or humiliated but having think through it, I get refreshed even to face greater challenges. Through these experiences, I achieved one of the objectives of SIWES which is to build for future challenges.

**CHAPTER 4**

**BENEFITS OF LEGAL METROLOGY TO THE ECONOMY**

* **Reduced Disputation and Transaction Costs**

The State Metrological compliance system was developed to provide, (through legislative requirements), trust and confidence in the measurements and minimise disputation and transaction costs. Elements of the system included pattern approval of measuring instruments to ensure they were fit for purpose and third party auditing and inspection of instruments to ensure accuracy and detect fraud.

This central role of the nation through Legal Metrology in setting rules was emphasised by The World Bank in its 1997 World Development Report on “The State in a Changing World” (97) that “an effective State is vital for the provision of the rules and institutions that allow markets to flourish. Without it sustainable development and equity in both economic and social”.

However in recent years a number of governments in developed countries have improved their commitment to their metrology system and placed greater reliance on the market to resolve measurement disputes.

* C**onsumer Protection**

Measurement, and goods packed by measure, has generally replaced number and simple measures (bucket, plate etc.) as the basis of transaction for a wide range of consumer commodities and products. The increased consistency of these measurements, when adequately controlled, has significantly reduced disputation, and fraud and increased the efficiency of the market place.

* **Effective Stock Control**

The aggregation of trade measurements by individual businesses provides accurate and effective stock control to facilitate the ordering of new stock. This is a spill-over benefit of the trade measurement system.

* **Full Collection of Government Excise and Taxes Based on Measurement**

Governments of both developed and developing nations collect significant amounts of revenue through excise and resource rent taxes based on measurement.

* **Full National Benefit for Commodity Exports**

Export income from the sale by measure of bulk and pre packed commodities is a significant component of both export and national income for many nations. Often for reasons of jurisdiction or lack of technical capability these measurements are not metrologically controlled by the State with a consequent risk of loss of national income.

* **Support of Global Trade in Measuring Instruments**

The development of International Recommendations for the Pattern approval of measuring instruments supports the global market for measuring instruments to internationally recognised standards.

* **Support of a Civil Society**

As mentioned in the Introduction, measurement has been an important component of the culture of all civilisations. However when measurements are used in trade transactions or government regulation there is a lack of transparency and imperfect information about the measurements. This is overcome by government legislations that establishes the rules of the measurement system and by Government enforcement of these rules. This system reduces disputation over trade transaction and government regulation and is an important component of the social capital of a society. As such an effective measurement system provides essential social capital and supports a civil society.

* **Technological Education** The systematic structure of the measurement system provides an important but largely unrecognised educational tool for industry and the community. The regular use of measurements in everyday life transfers simple but important technological concepts to the community. The effectiveness of this education is particularly demonstrated by shoppers detecting fraud in the market place.
* **Reduction of Deaths and Injuries from Accidents and Hazards**

Application of legal metrology in health and safety applications can significantly reduce accidents and hazards by changing people’s behaviour, providing early warning signals and providing effective enforcement of safety requirements. An example is the impact of the use of safety cap in machineries and safety kits in Engineering. The economic impact of such reduction in fatalities can be very high.

* **Improvement in the natural environment**

Legal Metrology has a wide range of applications in the monitoring and control of the natural environment, OIML (International Organisation of Legal Metrology) have developed a number of International recommendations for instruments measuring organic and metal pollutants, pesticides and toxic substances and automobile emissions.

**RELATIONSHIP BETWEEN METROLOGY AND ENGINEERING**

Metrology deals with measurements and weights, whereas, there is no activity in Engineering that can be done without measurement, so there is a strong relationship between Metrology and Engineering.

Legal Metrology deals with the enforcements of Weights and Measures Act on individuals, parastatals, organisations, institutions etc. It helps in the regulatory of instrument calibrations and in the production of measuring devices.

Legal Metrology helps in enforcing Mechanical Metrology in the production of engineering devices and products. It ensures fairness in Engineering measurements and calibrations.

It helps in the construction of tools, engineering materials, instruments and device and so reduces irregularities and non conformity of materials and equipments. It ensures accuracy in all measurements taken by engineers or engineering firms and companies.

**CHAPTER 5**

**SUMMARY**

Metrology is the science of measurement. Legal Metrology provides regulations for the control of measurements and measuring instruments. Legal Metrology also provides protection of public safety, the environment, consumers, and traders and is critical to fair and equity trade.

On a daily basis, engineers, consumers, traders, government regulators and industries make decisions based on measurement results. These measurements affect economic and personal well being. From a consumer's perspective, for example, a kilogram of rice must be a kilogram or more but not less. On the seller’s perspective, a kilogram of rice must be a kilogram or less but not more. Legal Metrology comes in this case by ensuring fairness and equity in transactions, either domestic or industrial.

Legal Metrology (the science of measurement) is an essential requirement in an economy which underpins the sale at both retail and wholesale level of food, petrol and many other goods, a sector of trade which accounts for more than 31.6% of Nigerian's gross domestic product.

Legal Weights and Measures are fundamental to a sustainable trading economy, the concept of sale and purchase cannot exist without them. In our everyday lives people make many purchases that rely on their confidence in the system that ensures correct measures, and likewise businesses need to know they are trading in a fair marketplace where no one company has an unfair competitive advantage.

All these and some other additional information are the essentialities and quotient activities of Weights and Measures (Legal Metrology) Department.

**PROBLEMS ENCOUNTERED**

* There are fewer members of staff in my place of attachment, thereby making me to be loaded with a lot of responsibilities.
* The working hour exceed the ‘8 hours of work’ thereby making me not to have time for myself in engaging in other activities.
* The IT student do not have a specific job, thereby involving in different job related activities in the department on daily basis, designated duties are assign to the Corps Members and Staffs.
* Lack of finance for transportation and other expenses due to the environment of the establishment and non-availability of stipends.

**SUGGESTIONS FOR THE IMPROVEMENT OF THE SCHEME**

* The Organisation should employ more staffs in other to be able to attend to IT/SIWES students to improve on their skills.
* The Organisation should train the IT/SIWES students for a particular work, instead of sitting down idle or running errands. This will make them to be more serious and punctual.
* Students should be posted to the department/section that is relevant to their discipline/ Course of study in other to improve on their skills.

**RECOMMENDATIONS**

As a result of difficulties experience during the Four months SIWES program, I will like to recommend the following changes;

* The Industrial Training Fund should make monthly allowance available for students, so as to put end to financial difficulties that may arise as a result of transportation problems.
* The Institution must confirm that each student partake in the Industrial Training program, by making sure that they pay every student a visit before the end of the program.
* The Institution and Industrial Training Fund should help the student to get the place of attachment, so that the program will commence as planned.
* Students on SIWES program should be posted or deployed to the Organisations, Department or Firms that are relevant to their Course of study, so that the sole aim of SIWES can be achieved.
* Proper modalities should be put in place to monitor students on SIWES to ensure that none of the students boycott the program.**CONCLUSION**

The Engineering discipline is practical in nature and mainly hinged on experience. Hence there is a great need for any student aspiring to be a Professional Engineer to have some forms of work experience while studying at school, in a reputable engineering firm to his/her course of study. The SIWES program has exposed me to practical work and administrative duties, which in great light enabled me to relate what I learnt in school to real world situation, especially the only course that is related to this establishment, which is Instrumentation.

It makes me to understand the underground duties performed for the end-product activities and results that we see in the environment.

It also expose me to the brainwork that is been performed in the nation’s parastatals to produce an effective and conducive economic environment.

**LIST OF TABLES, DIAGRAMS AND CHARTS:**

ACTION SHEET

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**A TYPICAL SKETCH DIAGRAM OF A SERAPHIN**

(Instrument Used In Measuring the Accuracy of Fuel Pumps)

**REFERENCES:**

*World Bank 1997 World Development Report*

*Weights and Measures Act 2007*

*Pre-shipment Supervision Act*

*ITF website: http://odich.com/itfnig/*

*Weights and Measures website:* *https://www.wmdnigeria.com/legalmeta.aspx*

*Federal Ministry of Industry, Trade & Investment website: http://www.fmti.gov.ng*