KWARA STATE POLYTECHNIC ILORIN

INSTITUTE OF TECHNOLOGY (IOT)

DEPARTMENT OF ELECTRICAL-ELETRONICS ENGINEERING

Report on Siwes held at:

BASH NIGERIAN ELECTRICITY MANAGEMENT SERVICES AGENCY

SUBMITTED BY:

HAMMED HAMMED
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CHAPTER ONE

1.1 INTRODUCTION AND HISTORY OF SIWES

Students' Industrial Work Experience Scheme (SIWES) is a human capital formation programme through industrial attachment for which students are expected to have a practical experience on the basis of theories and principles acquired in the teaching-learning process. However, the prevalence of the inability of participants of SIWES to secure employment after the programme casts doubt on the continuing relevance of SIWES to the contemporary industrial development drive in Nigeria. Human resource development constitutes the most critical factor in the development process and the quality must therefore be inherent in the productive capacity of people.

Human societies in the quest for development have identified and developed institutional as well as structured training and educational programmes as major avenues for processing human beings to acquire the necessary skills and technical competence for their roles in the development of the society.

In this context, Ojeleye (1994) observed that, it is not only in advanced nations that science and technology are spreading, but that, they are increasingly valued whenever people value their nation's independence, prosperity, power and prestige, and also, where nations seek a high standard of living, improved health or better education. In most discussions on human resource management, training and development represents the most significant, Ashton and Felslead (1995) regarded investment by organizations in the skill acquisition of employees as a 'Litmus test' for a change in the way they are managed.

Since independence, the issue that has attracted the interest of succeeding Governments in Nigeria has been that of human resource development. From the beginning of Nigeria's nationhood, it was imminent that the pace of national development through technological advancement devolved not so much on the availability of means or resources, rather, on the articulation and effective utilization of the vast human and material resources. It is on this basis that investment on training of the human factor becomes a serious challenge as science and technology related courses are requisite for national development (NISER, 2000)

Therefore, it is observed that, initial efforts aimed at achieving rapid national development were concentrated on the expansion of formal educational institutions, though these considerably increased in number, yet did not and were not expected to have acquired the skilled, knowledge and varied technological expertise required to meet the needs of special and vital sectors of the economy. However, the fundamental role of education in human resource development is a matter of priority for any developing country to evolve a functional education policy. This is necessary because, only through such priority can a country lay a solid foundation for a future, stable and result-oriented human resource development.

Thus, growth and development, which will result form effective organizational change, depend on a well-educated and adequately skilled human capital that is capable of applying vision, knowledge and creativity to their economic activities. Thus, industrial education which can be achieved through the formal or/and informal educational approach(es) attracted the attention of Government and individuals, in contemporary development environment.

Students' Industrial Work Experience Scheme (SIWES) is a programme designed to expose and prepare students of Universities, Polytechnics, Colleges of Technology, Colleges of Agriculture and Education for Industrial Work situation which they are likely to meet after graduation. It is a skills training programme which affords students the opportunity of familiarizing, acquiring and exposing themselves with the needed experience in handling industrial equipment and machinery that are not usually available in their institutions.

Usman (1983), then notes that the acquisition and development of knowledge, skills and capabilities can either be facilitated through the educational system or through other non-formal educational approaches. And it is also observed that, an effective industrialization policy is certainly difficult, if not impossible, without an effective human resources development policy (Olaiya, 1998). Considering all the facts of production, the human factor is the most important. Without skilled personnel in all facets of production, management, distribution, marketing and supervision among others, the objectives for which industrial policy have been drawn become unachievable.

1.2 STATEMENT OF THE PROBLEM

Students industrial work experience scheme (SIWES) is a laudable skills acquisition programme which is geared towards technological development of the nation. However, the scheme cannot be said to have achieved the desired objectives due to many factors ranging from the structural causes of performance problems that have plagued the system, but also increasing number of students and institutions which place undue pressure on the few surviving industrial organizations and most students on attachment in places of convenience without giving considerations to the relevance of the workplace to their course of studies. The study is therefore to determine the influence of SIWES on skills development, utilization and the incidence of graduate occupational misfit in Nigeria.

1.3 IMPORTANCE AND OBJECTIVES OF SIWES

Specifically, the Student Industrial Work Experience Scheme (SIWES) is responsible for:

- Provide an avenue for students in institutions of higher learning to acquire industrial skills and experience in their course of study, which are restricted to Engineering and Technology including Environmental studies and other courses that may be approved. Courses of NCE (Technical), NCE Agriculture, NCE (Business), NCE (Fine and Applied Arts) and NCE (Home Economics) in Colleges of Education are also included.
- Prepare students for the industrial work situation they are to meet after graduation;
- Expose students to work methods and techniques in handling equipment and machinery that may not be available in their institutions.
- Make the transition from school to the world of work easier, and enhance students contacts for later job placement;
- Provide students with an opportunity to apply their knowledge in real work situation thereby bridging the gap between theory and practice; and
- Enlist and strengthen employers, involvement in the entire educational process and prepare students for employment in Industry and Commerce.

1.4 OBJECTIVES OF THE STUDY

The specific objectives are to: i) find out the contributions of SIWES to human resources development through certification and accreditation of technology-based courses; ii) establish the correlation between the needs of employers of labour and the skill potentials of SIWES participants; and iii) determine the level of supervision and funding by collaborating institutions. The study then hypothesized that

CHAPTER TWO

2.1 LOCATION AND BRIEF HISTORY

The Nigerian Electricity Management Services Agency is established by NEMSA Act 2015 (now the Electricity Act 2023) to carry out the Enforcement of Technical Standards and Regulations, Technical Inspection, Testing and Certification of all categories of Electrical Installations, Electricity Meters and Instruments to ensure an efficient production and delivery of safe, reliable and sustainable electricity power supply and guarantee safety of lives and property in the Nigerian Electricity Supply Industry (NESI), and other allied industries, workplaces and premises.

The priority of the Agency is to have electricity networks that are Stable, Safe, and Reliable.

Through close collaboration with our partners, NEMSA strives to ensure zero incidence of electrical accident, energy accountability, eliminate substandard electrical equipment & materials and rid the system of quack Electrical Installation Personnel and Contractors.
One of the key strategies to realize our vision is through Effective Service Delivery and we do this by consistently applying our corporate culture defined by a simple set of corporate values to wit;

1. Quality Service and Safety,
2. Honesty and Integrity, as well as
3. Leadership and Collaboration.

Whether you are an individual or corporate Electrical Installation Contractor, Electric Concrete Pole Manufacturer, Electricity Meter, Transformer and Instruments Manufacturing/Assembling Company, or simply reporting an electrical accident, we look forward to finding out how we can work together to bring about efficient, safe, and reliable Networks for Nigerian Electricity Supply Industries and other allied industries, work places and premises.

CHAPTER THREE

3.1 TRAINING EXPERIENCE

3.2 SOLAR ENERGY

Solar energy is a sustainable and increasingly affordable way to power your home. Drawing their power from the natural resources provided by the sun, more homes across the UK are benefiting from this green energy supply than ever before.

But in order to take advantage of this, it's important you have a solar array which has been correctly installed. **In this short guide we're going to walk through the eight-step process of installing solar panels on a home**, as well as providing an overview of how long you can expect it to take, and what you can do to help maintain your array.

A planning phase precedes all installations. **The typology of your house and your annual energy spending are to be taken into account at this point**. After all, you want the size of your system to be proportional to your consumption. At Otovo, there is no standard solar panel installation, as all of our experts' recommendations are tailor-made for your home.

HOW SOLAR PANELS ARE INSTALLED

Solar panels are typically installed on the roof, which means that the shape and orientation of the latter should be studied beforehand. Just as important will be the observation of the surroundings, to ensure that there won't be any shadings to impact negatively on the performance levels of the system. In fact, that is one of the most valuable tips one can give you before proceeding with the work: **to carefully inspect the environment around you and check if there is any element that may be (or become in the future) a problem for your panels.** In case shading is expected to be an issue, then optimisers should be added in order to get the best out of the system.

Then, there's quite an extensive process involved in ensuring everything is done efficiently and safely. Most installation projects will follow a similar beat, which usually consists of eight different stages.

Step 1 – Scaffolding

If your installation is going to take place on the roof, scaffolding needs to be erected in order to safely access where the panels are going to be fitted. This usually takes the best part of a day, and accounts for roughly half of the time you can expect the project to last.

Step 2 – Mounts

The mount is what your solar panels are going to sit on. This is the first thing that'll be attached to your roof or wall, **and will serve as the support for the base of your array.**

The mounting structure will need to be titled in order to maximise the amount of sunlight that your panels receive. This should be anywhere from 18 to 36 degrees, depending on the slant of your roof.

Step 3 – The solar panels

Next, and arguably most importantly, come the solar panels. Once your mounts are securely in place, these will be attached and tightly screwed on to ensure the panels remain stable at all times. At this point, your solar array will be looking the part – but not quite operational.

Step 4 – Wiring

Just like with batteries and inverters, solar panels can be wired either in series or in parallel. **The most crucial difference between those two types of wiring configurations is related to their output voltages and currents.** If you install solar panels in parallel, their output voltages will remain the same and their output current will be a sum of all parts. By contrast, if you install solar panels in series, their output current won't change, though their voltages will be a sum of all parts. A professional installer will be able to assess which one is right for you. This is a very technical step, and one which should only be carried out by someone with a detailed knowledge of how to wire an electrical circuit which uses AC and DC currents.

Step 5 – The solar inverter

Once your panels are wired, a solar inverter will need to be connected to the system. This is the device which turns the solar energy that's been absorbed throughout the day into the electricity which will power your home.

This is most often installed near to the main panel, and can be kept either outside or inside the building. As they tend to work more efficiently when kept in a cool place, it's recommended to keep them inside (such as a garage, or any room which gets regular ventilation).

If you do decide to have yours installed on the outside of the building, try to have it facing away from a spot where it'll get hit by the midday sun (when temperatures are at their hottest).

Step 6 – Bond inverter and battery

If you're adding a solar battery to the project, the inverter can be connected to it at this point. There are many advantages to adding a solar battery to your array, such as using stored energy as

a backup on darker days, **as well as potentially lowering the solar battery storage system costs.**

But how does it work to install solar panels with a battery? To begin with, you ought to know you need a hybrid inverter capable of managing the charging and discharging of the batteries, as these are the most expensive and delicate element of the entire system. Their storage capacity will vary according to the size of your system and your standard energy spending.

Depending on the voltage and capacity needed, there is more than one way to do it. The batteries can be connected in parallel, in series or in series and in parallel. In the case of parallel connections, the capacity of the batteries doubles, but the voltage remains the same. As for the batteries connected in series, the obtained results are the opposite: their capacity stays the same, but the voltage doubles. Finally, if a series and parallel connection is preferred, both the capacity and the voltage double.

Step 7 – Connect the inverter

The converter has been installed, but it's at this stage that it gets connected to the consumer unit (the appliance which controls the distribution of solar energy throughout your home).

You might also want to consider adding a generation meter at this stage, as it will allow you to monitor the performance of each individual solar panel. This can help to give you better insight into what time of day is best to run home appliances like a washing machine, dryer, or oven.

Step 8 – Test the solar panels

At this point, the hard graft will be over. But you'll still need to make sure the panels are working properly. Flick the power on and discover if the installation process has been a success. If it has, you're all set up and ready to go.

3.3 ELECTRICAL WIRING

Electrical wiring is an electrical installation of cabling and associated devices such as switches, distribution boards, sockets, and light fittings in a structure.

Wiring is subject to safety standards for design and installation. Allowable wire and cable types and sizes are specified according to the circuit operating voltage and electric current capability, with further restrictions on the environmental conditions, such as ambient temperature range, moisture levels, and exposure to sunlight and chemicals.

Associated circuit protection, control, and distribution devices within a building's wiring system are subject to voltage, current, and functional specifications. Wiring safety codes vary by

locality, country, or region. The International Electrotechnical Commission (IEC) is attempting to harmonize wiring standards among member countries, but significant variations in design and installation requirements still exist.

The electrical wiring scope must cover installation, testing, supply and commissioning of all accessories, wiring, switches, conduits, spur outlets, and many more. Thus, electrical wiring needs further attention, especially for building projects. Several factors are to be considered before doing the actual installation work whether for commercial, residential or industrial wiring. Electrical experts should also consider factors like wall and floor construction, installation requirements, type of ceiling, building construction, etc.

We will discuss the concept of electrical wiring for today's blog, including different wiring systems and installation methods, and the basic wiring preparation. Everything in this blog will serve as a guide for electrical professionals in dealing with various electrical works.

The Major Importance of Appropriate Electrical Wiring

Electrical wiring that is done inappropriately is a risk and a fire hazard. It is the major responsibility of electricians to trace any electrical ambiguities. That is why, they need to have a broader electrical experience, in-depth knowledge and a license to deal with such issues. For others, wiring seems to be as simple as lights on and off. However, there is an intricate process going on deeper than the surface that only qualified electricians know. Connection circuits that are poorly designed are unsafe and can damage electronic gears and appliance motors. A poorly designed connection circuit delivers the incorrect amperage.

The process of connecting numerous accessories for the distribution of electrical energy from the meter board to home equipment is called electrical wiring. Electrical wiring installation can be done using two methods: Joint box or Tee system and Loop – in the system. Both are discussed as follows:

Below are the two common installation methods for electrical wiring.

1. Joining box or Tee System

In this installation method, connections to any appliances are prepared through joints. The joints are made from joint boxes using appropriate connectors and joints cutouts. This method of wiring doesn't consume cable sizes. Electrical experts have to take note that this installation might be expensive in a few cases. Structure for this system will be made easier using builder trends software. It's a trend that must be considered by electrical contractors.

2. Looping System

This wiring installation method is universally used in any electrical method. Other appliances and lamps are connected in a parallel position so that every appliance can be separately

controlled. When the connection is required, the feed conductors are being lopped in by getting it directly to the terminal and then fetching it forward again to the next points.

The light and switch feeds are carried around the circuit by a series of loops. It will be carried around from one point to another until the last on the circuit is reached. The line or phase conductors are lopped either in a box or switchboard.

For a much better understanding of the concept of wiring, below are a few examples of the wiring circuits.

Single bulb controlled only by a one-way switch

In this wiring circuit, the hot wire is typically connected to one terminal directly to the switch. The other terminal is connected directly to the positive bulb terminal.

- **Two bulbs controlled by a one-way switch**

Two bulbs are usually connected with supply wires in parallel. A separate one-way switch will route it. This type of wiring sample is known for its simplicity.

- **Single blub controlled by two-way switches**

The wiring is termed as staircase wiring wherein a light lamp will be controlled from two primary sources. This type of wiring is used for bedrooms to switch on/off from two sources.

- **Go-down wiring**

This type of wiring is used in long passages, tunnel-like structures and long passages. It follows a linear sequence for switching the lights from one end and to the others.

- **Fluorescent lamp controlled by a one-way switch**

In this circuit, the phase wire is going to be connected to one end of the switch. Yet, another end switch will be connected to the ballast (choke). One electrode of the lamp is connected to the other neutral terminal and choke.

- **Socket outlet wiring**

The outlet passes the current and holds a plug when the power is routed directly to the socket. The radial socket connection and a single socket connection are present.

CHAPTER FOUR

CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

Coordinators and Organizers of the SIWES programme must in earnest compel tertiary institutions to adhere strictly to the duration for SIWES attachment in any industry if they really want to bridge the gap between the theoretical knowledge acquired in tertiary institutions and the practical skills required in today's workplace. SIWES coordinators should take note that there are some companies or industries in the country who don't allow industrial attachments, such companies should be penalized under section 8A (2) of Decree No. 47 of 1971 as amended in 2011. By doing this more credence would be given to the Programme. I urge undergraduates to seize the opportunity given by the SIWES programme to develop their skills and prioritize practical development over theories in their academic pursuit in various field of study. SIWES has made me to see the other side of my course of study and also afforded me the opportunity to make use and link what I have learnt in the lecture room in the practical field.

4.2 RECOMMENDATIONS/SUGGESTIONS

Although SIWES undergone did achieve quite a lot of its stated objectives, nevertheless, the following recommendations are suggested to improve the qualitative context of the programme:

i. Participation of private corporate organization to minimize the problem of low funding as recently complained by the director of ITF.

ii. Sending students specifically to establishment where the stipulated aims and objectives of SIWES would be achieved.

iii. Payment of befitting student allowance to assist in students finances during the period of training.

iv. The station should have a method of recognizing its SIWES students through issuance of recommendation letter in addition to letter of completion to enable the students secure job placement in both public and private sectors.

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