TECHNICAL REPORT ON STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (S.I.W.E.S)

AT

ECONOMIC AND BUSINESS POLICY DEPARTMENT
NIGERIAN INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH
(NISER)

BY

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MATRICULATION NUMBER: 192235

OF

THE DEPARTMENT OF MATHEMATICS

FACULTY OF SCIENCE

UNIVERSITY OF IBADAN, IBADAN
OYO STATE, NIGERIA.

FROM

SEPTEMBER 2018 - FEBRUARY 2019

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc) IN MATHEMATICS

27th February, 2019.
The Director,
Industrial Training Coordinating Centre (ITCC),
University of Ibadan, Ibadan, Nigeria.
Sir,

SUBMISSION LETTER FOR MAT399 WORK REPORT

Having completed the twenty-four weeks training programme required by the Student Industrial Work Experience Scheme (S.I.W.E.S) which started on the 10th September, 2018 and ended on the 22nd February, 2019. I hereby write to inform you that this report work was compiled and completed by me AYADI, Fayowole David of Department of Mathematics, Faculty of Science, University of Ibadan with matriculation no 192235. I therefore submit the Work Report in partial fulfilment of the requirement for the award of B.Sc Mathematics at the University of Ibadan.

Yours Faithfully,
AYADI, Fayowole David (192235)

CERTIFICATION

I, AYADI, Fayowole David of the Department of Mathematics, Faculty of Science, University of Ibadan with matriculation number 192235 hereby declare that I underwent twenty-four full weeks of Industrial Training Programme at Nigerian Institute of Social and Economic Research, Ojoo, Ibadan and that this work report is written by me to the best of the practical knowledge I gained during the course of the training programme.

ACKNOWLEDGEMENT

My profound gratitude goes to the Almighty God for the enabling grace He granted me to successfully completes my SIWES programme.

I am immensely grateful unto my H.O.D. (Dr Mrs AJAYI, Deborah) Department of Mathematics and all other lecturers in the Department for the knowledge that they have over-time impacted in me and for their tangible and indispensable counsels.

I am also grateful to the Management of Nigerian Institute of Social and Economic Research (NISER), Ibadan, in particular, Economic and Business Policy Department, the Industrial SIWES Supervisor (Dr. D.F. Arawomo), Prof. Godwin Adpokodje (Director of Economic and Business Policy Department) and other members of staff for their supervision and assistance. I also want to appreciate my colleagues who taught me some statistical packages.

Finally, I appreciate my lovely family for the roles they played ranging from the monetary support, advices, prayers and all other things which greatly contributed to the success of my SIWES Programme.

ABSTRACT

I observed my Student Industrial Work Experience Scheme at Nigerian Institute of Social and Economic Research (NISER), Ibadan, Oyo State, Nigeria. During my SIWES, I was able to learn how to make use of some complex statistical (computational) packages in coding and analyses of data, either primary data or secondary data. And I also learned how to interpret analyzed data for end users. Furthermore, I saw the practical applications of Mathematics to solve problems in organizations, companies and some other subsidiary institutes. The research institute enabled me to bridge the gap between theory and practical.

Contents

1 STUDENT'S INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

1.1 Introduction

The Students' Industrial Work Experience Scheme (SIWES) is a programme designed to give students the needed experience and also to prepare them for work situation they are likely to meet after graduation. It was provided as an attempt to breach the gap between theoretical and practical curriculum of engineering, technology, science, agriculture, medical, management and other professional programmes in the Nigerian educational system. It was aimed at exposing students to needed experience in handling of machineries and equipment which are usually not available in the educational institutions. Also, it enables students to familiarize themselves with the environment and know how to relate with other people, which prepare them for the outside world. It is a mandatory activity for all 300 level students in Department of Mathematics, University of Ibadan, Ibadan. It spans for six months.

1.1.1 Background

In Nigeria, Industrial training began with the dependence of industries on technical competencies on the operation and maintenance of its resources. Industrial training or work experience had its origins in the practice at the first Nigerian Polytechnic, the Yaba Technical Institute (now Yaba College of Technology) which was founded in 1948. Students were sponsored by government establishments or private firms at the time. They returned to work with their employers during the long vacations. This enabled students to have some form of Industrial training or work experience integrated with their learning at the Polytechnic.

1.2 Industrial Training Fund (ITF)

The industrial training fund is a grade "A" parastatal operating under the aegis of the Federal Ministry of Industry, trade and investment. It has been operating for over 46 years as a specialist agency that promotes and encourages the acquisition of industrial and commercial skills required for national economic development.

The main thrust of ITF programmes and services is to stimulate human performance, improve productivity, and induce value-added production in industry and commerce. Through its SIWES and vocational and apprentice training programmes, the fund also builds capacity for graduates and youth self-employment, in the context of small scale industrialization, in the economy.

1.3 Scope of SIWES

SIWES is a short word for Students' Industrial Work Experience Scheme. According to the National Universities Commission (NUC), SIWES is the accepted skills training programme which forms part of the approved minimum Academic Standards in various degree programmes for all Nigerian Universities. The aim of the programme is to solve the problem of inadequate practical skills required for employment in industries. The Student Industrial Work Experience Scheme is a government-approved and mandatory phase of education scheme that is open to undergraduate students in the following fields: Agricultural Science, English, Technology, Environmental Science, Education, Medical Science, Pure and Applied Sciences.

1.3.1 Bodies Involved In The Management Of SIWES

The bodies involved are Federal Government and Industrial Training Fund (ITF). Other supervising agencies are National University Commission (NUC), National Body for Technical Education

(NBTE) and National Council for Colleges of Education (NCCE).

1.3.2 Function Of The Agencies / Bodies

The function of the agencies above include among others:

1. To ensure adequate funding of the scheme
2. To establish SIWES and accredit SIWES unit in the approved institution
3. To formulate polices and guidelines for participating bodies and institutions as well as appointing SIWES coordinators
4. To supervise students at their place of attachment and sign their log book and supporting staff and ITF forms.
5. To ensure payment of allowances for the students and supervisors

Therefore, the success of SIWES depends on the efficiency of the Ministries, ITF, Institutions, Employers of labor, articulation and management of the program. Thus the evaluation of SIWES in tertiary institutions in meeting up with the needs for the establishment of the program is necessary.

1.3.3 Objectives of SIWES

The Student Industrial Work Experience Scheme (SIWES) is a program that is designed to breach the gap between theoretical experience and practical experience with the following objectives:

1. To provide an avenue for students in institutions of higher learning to acquire industrial skills and experience in their course of study.
2. To satisfy accreditation requirements set by Nigeria Universities Commission (NUC).
3. To make transition from university to industry for graduates easy.
4. To enlist and strengthen industries involvement in university education.
5. To enable students asses their interest and suitability of their chosen profession.
6. To enable university educators assess the effectiveness of their curriculum and make modifications if found necessary.
7. To provide access to equipment and other facilities that may not be available in the university laboratory and workshop.
8. To provide students with the opportunity to see the real world of their discipline and consequently, breach the gap between the class room and the real work situation.
9. To familiarize students with typical environments in which they are likely to function professionally after graduation.

1.3.4 Benefits of Industrial Training to Students

1. The scheme provides students the opportunity to apply the theoretical principles taught in school in real job situation. This leads to better understanding of the subjects.
2. It affords them the opportunity to interact with a larger spectrum of people in industrial set up which is different from campus life. Hence this helps personality and maturity development.

3. It enables the students prepare themselves for the future world of work. The taste of the pudding is in eating. Hence this is an opportunity to peep into the future and determine how much they are ready for it.

4. The scheme helps the student in developing intellectual skills as they are often left on their own to take technical decisions and often analyze complex interdisciplinary problems and proffer solutions applicable to real situations.

1.3.5 Roles of the Student During SIWES

1. Obey all rules and regulations.

2. Be regular and punctual.

3. Be involved in all tasks and assignments.

4. Be an ambassador of University of Ibadan.

1.4 The Logbook

This is a book that was designed to assist students in keeping accurate records of their training during SIWES. It shows the department/section of the industry/company where a student has worked, and the period spent in each department/section.

The logbook contains records of the activities of each working day clearly written with sketches and diagrams where necessary.

The logbook must be submitted to the (Industry - based) supervisor(s) every week for comments and signature.

The University SIWES supervisor/ITF Officer/Industrial liaison officers will check the logbook during their visits to ensure that proper training is being received by each student, and also record their comments.

Each student is expected to obtain and complete the information needed as regards the organizational profile of the establishment/company to which they are attached.

2 GENERAL OVERVIEW OF NIGERIAN INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH

I had my Student Industrial Work Experience Scheme (SIWES) at the Nigeria Institute of Social and Economic Research, which is situated along Ojoo road, Ibadan, Oyo State. The institute is federal government-owned, and like other institutes has its history, statutory functions, organizational structure and administrative structure. The purpose of this is to provide a well-defined and smooth running of the institution.

2.1 History

The history dates back to 1950 when the West Africa Institute of Social and Economic Research (WAISER) was set up to provide information on issues of vital importance to the development of British colonies then in West Africa.

The disintegration of WAISER started with the independence of the Gold Coast (now Ghana) in 1957. WAISER was formally dissolved in 1960 when Nigeria attained independence. It was replaced in Nigeria by the Nigeria Institute of Social and Economic research (NISER), which was established on 14th December, 1977 with the aim of providing consultancy services to the federal and state governments in the field of economic and social development and to conduct research on the social and economic problems of Nigeria. NISER has since then become a research and consultancy parastatal of the federal government of Nigeria.

In January, 2006 the federal government approved the merging of the National Manpower Board (NMB) with NISER, retaining the NISER name and its functions. NISER headquarter is permanently located in Ibadan at Ojoo, along Oyo Road, with two liaison offices in Abuja and Lagos and six zonal offices in Akure, Bauchi, Enugu, Minna, Port Harcourt and Sokoto.

2.2 Statutory Functions of NISER

The functions of the institute as stated in Act 70 of 1977 (updated to NISER Act, Laws of the Federation of Nigeria, 2006 chapter N115) are to:

1. Provide consultancy services to the federal and state governments, their agencies and organizations in the field of economic and research development.

2. Conduct research on the economic and social problems of the country with a view to the applications of the results thereof.

3. Organize seminars and conferences on problems of economic and social development in the country whether on its own accounts or on behalf of the government of Nigeria and other agencies.

4. Cooperate with nigerian universities, and research institutes and other institutions in the mobilization of the country's research potentials for the task of national development and dissemination of research findings for the use of policy makers at all levels.

2.3 NISER'S Organization

Apart from the administration and finance department, the institute has four (4) Research departments; with nine (9) divisions, two (2) liaison offices, six (6) zonal offices and various units/sections.

The departments are; Agricultural and Rural Development, Economic and Technology Development, Human Resources Development and Utilization and Social Governance and Physical Development.

The divisions are: Manpower Planning and Utilization; Human Resources Development; Agricultural and Rural Development; Economic Development; Technology Development; Social Development; Governance Studies, and Physical Development.

2.3.1 Administrative Structure

NISER is headed by a body of council, whose membership includes; the Chairman, the Director of the Institute, the Director General, Federal Ministry of Industry or his representative, the Director, Central Planning Officer, the Chief Statistician, Federal Office of Statistics and the Director of Research, Central Bank of Nigeria, and the Directors of Departments and Heads of Units, Divisions and Sections. The institute is self-accounting and it has internal and external auditors.

A number of management committees exist to advise the Director-General with regards to policy formulation related to day-to-day administration of the Institute.

The Management committees are:

1. Personnel committee
2. Research and Consultancy committee
3. Editorial committee
4. Due process committee
5. Publication committee
6. Housing committee

In addition, the management committee or the Director-General appoints a number of ad-hoc committees when the need arises.

The institute is governed by a Governing Council, whose functions according to the NISER Act section 3 is to:

1. Approve the research and training programmes of the institute.
2. Subject to section 5(4) of the enabling Act, approve conditions of service of the employees of the institute including provision for the payment of pensions.
3. Determine fees to be paid for research, consultancy and training services offered by the institute.
4. Carry out all other activities that are necessary and expedient for the full discharge of any of the functions conferred on it under or pursuant to the enabling Act.

2.4 NISER Major Research Activities

NISER has major research activities they engage in yearly. These researches include:

2.4.1 NISER Annual Monitoring Research Programme (NAMRP):

The main objectives of these research programme is to constantly monitor developments in agricultural, economic, social, governance, physical, human resources and business technological aspects of Nigerian society with a view of identifying potential problems for which anticipatory policy-oriented research expected of NISER can be organized. So far, the following development indicators have been operationalized and are being measured:

1. Agricultural production indicators
2. Critical skill utilization index
3. Economic self-reliance indicators
4. Index of housing indicators
5. Indicators of business conditions and expectations
6. Political development indicators
7. Quality of life indicators
8. Technological self- reliance indicators

2.4.2 NISER Review of Nigerian Development (NRND):

The primary objective of this research is to regularly profile development patterns in different sectors of the Nigerian economy. This research programme attempts a thorough analytical review of national data in a way that permits holistic overview of profiles and performances, compared across different economic and cultural enclaves that make up the complex structure of the Nigerian entity

2.4.3 Programme of Individual Research project (PIRP):

This research programme is intended to provide opportunities for the researchers to continue to develop their expertise and actively participate in the advancement of knowledge in their chosen fields of specialization. Every researcher is encouraged to undertake and complete an individual research project per year and as such, there are several completed and ongoing research projects in a wide range of subjects in the various social science and technology disciplines.

2.4.4 Externally Supported Research Projects:

Most of the research or consultancy projects undertaken by the institute at the instance and(or) with the support of the other organizations are aimed at articulation and for project development, execution and operation.

2.5 NISER Major Professional Activities

In accordance with its mandate, the institutes regularly undertake policy-oriented researches and consultancy projects for and/or with the support of the federal, state or local governments as well as their agencies, private sector organizations, and international organizations, such as the World Bank Group, International Development Research Centre (IDRC) of Canada, United Nations Development Programme, The MacArthur Foundation, the Brookings Institute and Think Tank Initiative. The institute also organizes conferences, seminars, workshops and training programmes, provides technical and administrative support for research networks as part of its efforts to mobilise the country's research potentials for the task of national development.

2.6 Partners

1. African Capacity building foundation
2. Federal government of Nigeria
3. Think Tank Initiative Management by IDRC.

3 DATA COLLECTION AND STATISTICAL (COMPUTATIONAL) TOOLS

3.1 Definition:

Statistics is a branch of mathematics that transforms numbers into useful information for decision makers. Statistics is sub-divided into descriptive and inferential.

1. **Descriptive Statistics:** Focuses on collecting, summarizing, presenting, and analyzing a set of data.
2. **Inferential Statistics:** Uses data that have been collected from a small group (sample) to draw conclusions about a larger group.

3.1.1 Applications of Statistics

1. To summarize business data
2. To draw conclusions from that data
3. To make reliable forecasts of business activities
4. To improve business processes

3.2 Data Collection

The collection of data that are relevant to the problem being studied is commonly the most difficult, expensive, and time-consuming part of the entire research project. Statistical data are usually obtained by counting or measuring items. Data collection is of two form;

1. Primary data are collected specifically for the analysis desired
2. Secondary data have already been compiled and are available for statistical analysis

Most data can be put into the following categories:

1. Qualitative - data are measurements that each fail into one of several categories. (hair color, ethnic groups and other attributes of the population)
2. Quantitative - data are observations that are measured on a numerical scale (distance traveled to college, number of children in a family, etc.)

3.2.1 Sources of Data

1. Data distributed by organizations or individuals
2. Experiment
3. Survey
4. Observational study
5. Coporate data

3.3 Statistical (Data) Analysis

Data analysis is the process of extracting information from data. It involves multiple stages including establishing a data set, preparing the data for processing, applying models, identifying key findings and creating reports. The goal of data analysis is to find actionable insights that can inform decision making. Data analysis can involve data mining, descriptive and predictive analysis, statistical analysis, business analytics and big data analytics.

Statistical analysis is used to manipulate, summarize, and investigate data, so that useful decision-making information results. Data analysis is one of the more important stages in our research. Without performing exploratory analyses of our data, we set ourselves up for mistakes and loss of time. Generally speaking, the goal is to be able to "visualize" the data and get a sense of their values. We plot and compute summary statistics to observe the trends and the distribution of our data.

An essential component of ensuring data integrity is the accurate and appropriate analysis of research findings. Improper statistical analyses distort scientific findings, mislead casual readers, and may negatively influence the public perception of research. Integrity issues are just as relevant to analysis of non-statistical data as well.

3.3.1 Considerations/Issues in Data Analysis

There are a number of issues that researchers should be cognizant of with respect to data analysis. These include:

1. Having the necessary skills to analyze
2. Concurrently selecting data collection methods and appropriate analysis
3. Drawing unbiased inference
4. Inappropriate subgroup analysis
5. Following acceptable norms for disciplines
6. Determining statistical significance
7. Lack of clearly defined and objective outcome measurements
8. Providing honest and accurate analysis
9. Manner of presenting data
10. Environmental/contextual issues
11. Data recording method
12. Partitioning 'text' when analyzing qualitative data
13. Training of staff conducting analyses
14. Reliability and Validity
15. Extent of analysis

3.3.2 How to Perform Data Analysis

Data analysis is a part of a larger process of deriving business intelligence. The process includes one or more of the following steps:

1. **Defining Objectives:** Any study must begin with a set of clearly defined business objectives. Much of the decisions made in the rest of the process depend on how clearly the objectives of the study have been stated.

2. **Posing Questions:** An attempt is made to ask a question in the problem domain. For example, do red sports cars get into accidents more often than others?

3. **Data Collection:** Data relevant to the question must be collected from the appropriate sources. Data might be collected from a variety of sources including: DMV or police accident reports, insurance claims and hospitalization details. When data is being collected using surverys, a questionnaire to be presented to the subjects is needed. The questions should be appropriately modeled for the statistical method being used.

4. **Data Wrangling:** Raw data may be collected in several different formats. The collected data must be cleaned and converted so that data analysis tools can import it. For our example, we may receive DMV accident reports as text files, insurance claims from a relational database and hospitalization details as an API. The data analyst must aggregate these different forms of data and convert it into a form suitable for the analysis tools.

5. **Data Analysis:** This is the step where the cleaned and aggregated data is imported into analysis tools. These tools allow you to explore the data, find patterns in it, and ask and answer what-if questions. This is the process by which sense is made of data gathered in research by proper application of statistical methods.

6. **Drawing Conclusions and Making Predictions:** This is the step where, after sufficient analysis, conclusions can drawn from the data and appropriate predictions can be made. These conclusions and predications may then be summarized in a report delivered to end-users.

3.4 Statistical (Computational) Tools for Analysis

3.4.1 EXCEL

Microsoft Excel is one of the top tools for data analysis and the built-in pivot tables are arguably the most popular analytic tool.

This section illustrates the powerful features Excel has to offer to analyze data.

1. **Sort:** You can sort your Excel data on one column or multiple columns. You can sort in ascending or descending order.

2. **Filter:** Filter your Excel data if you only want to display records that meet certain criteria.

3. **Conditonal Formatting:** Conditional formatting in Excel enables you to highlight cells with a certain color, depending on the cell's value.

4. **Charts:** A simple Excel chart can say more than a sheet full of numbers.

5. **Pivot Tables:** Pivot tables are one of Excel's most powerful features. A pivot table allows you to extract the significance from a large, detailed data set.

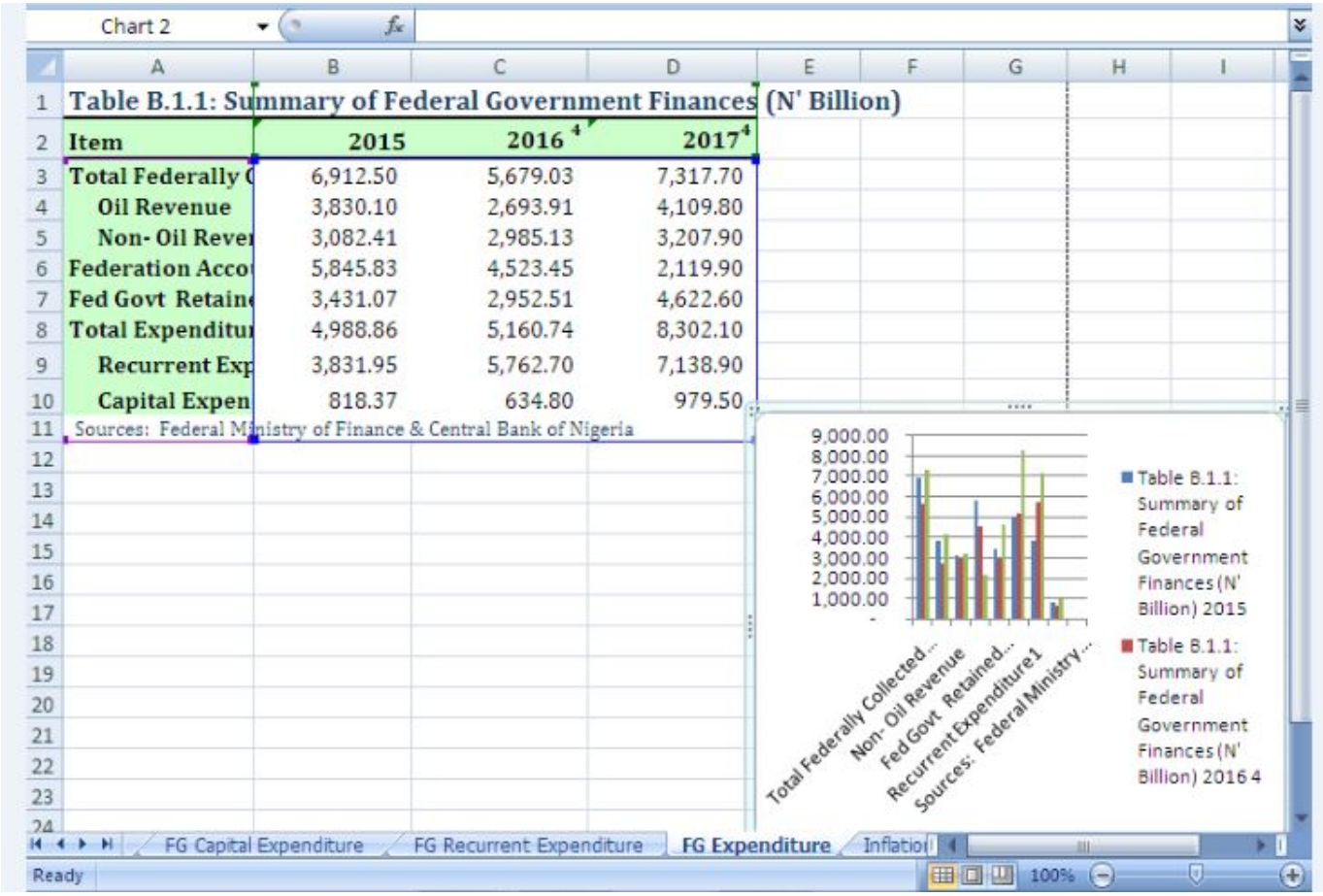
6. **Tables:** Tables allow you to analyze your data in Excel quickly and easily.

7. **What-If Analysis:** What-If Analysis in Excel allows you to try out different values (scenarios) for formulas.

8. **Solver:** Excel includes a tool called solver that uses techniques from the operations research to find optimal solutions for all kind of decision problems.

9. **Analysis ToolPak:** The Analysis ToolPak is an Excel add-in program that provides data analysis tools for financial, statistical and engineering data analysis

The picture attached herein is a short descriptive statistics using Excel for government finances



3.4.2 SPSS

SPSS software is widely used to analyze data and make predictions based on specific collections of data.

SPSS is short for Statistical Package for the Social Sciences, and it's used by various kinds of researchers for complex statistical data analysis.

The SPSS software package was created for the management and statistical analysis of social science data. It was was originally launched in 1968 by SPSS Inc., and was later acquired by IBM in 2009.

SPSS is used by market researchers, health researchers, survey companies, government entities, education researchers, marketing organizations, data miners, and many more for the processing and analyzing of survey data.

Most top research agencies use SPSS to analyze survey data and mine text data so that they can get the most out of their research projects.

The Core Functions of SPSS

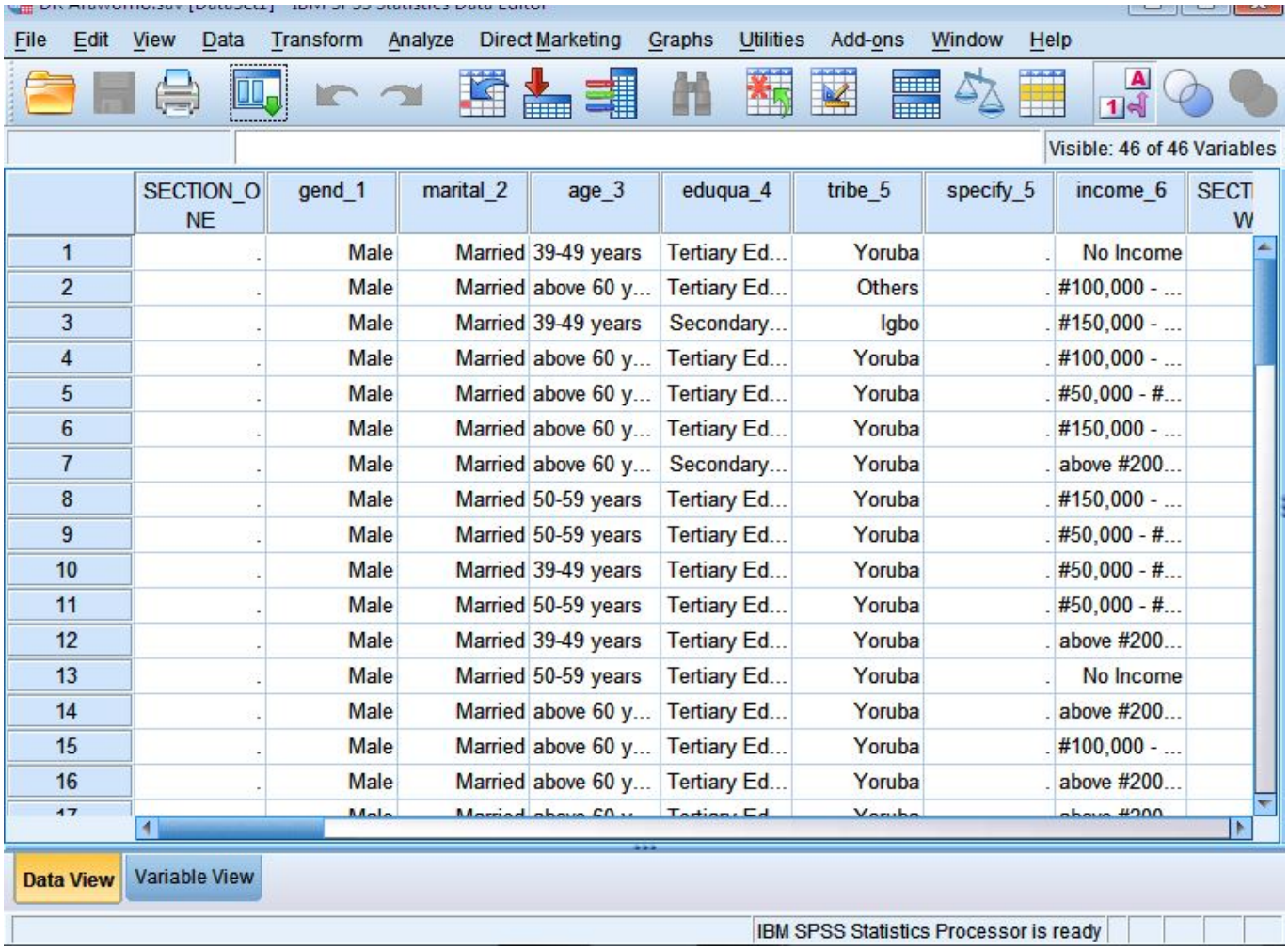
SPSS offers four programs that assist researchers with their complex data analysis needs.

1. **Statistic Program:** SPSS's Statistics program provides a plethora of basic statistical functions, some of which include frequencies, cross tabulation, and bivariate statistics.
2. **Modeler Program:** SPSS's Modeler program enables researchers to build and validate predictive models using advanced statistical procedures.
3. **Text Analytics for Surveys Program:** SPSS's Text Analytics for Surveys program helps survey administrators uncover powerful insights from responses to open ended survey questions.
4. **Visualization Designer:** SPSS's Visualization Designer program allows researchers to use their data to create a wide variety of visuals like density charts and radial boxplots with ease.

In addition to the four programs mentioned above, SPSS also provides solutions for data management, which allow researchers to perform case selection, create derived data, and perform file reshaping.

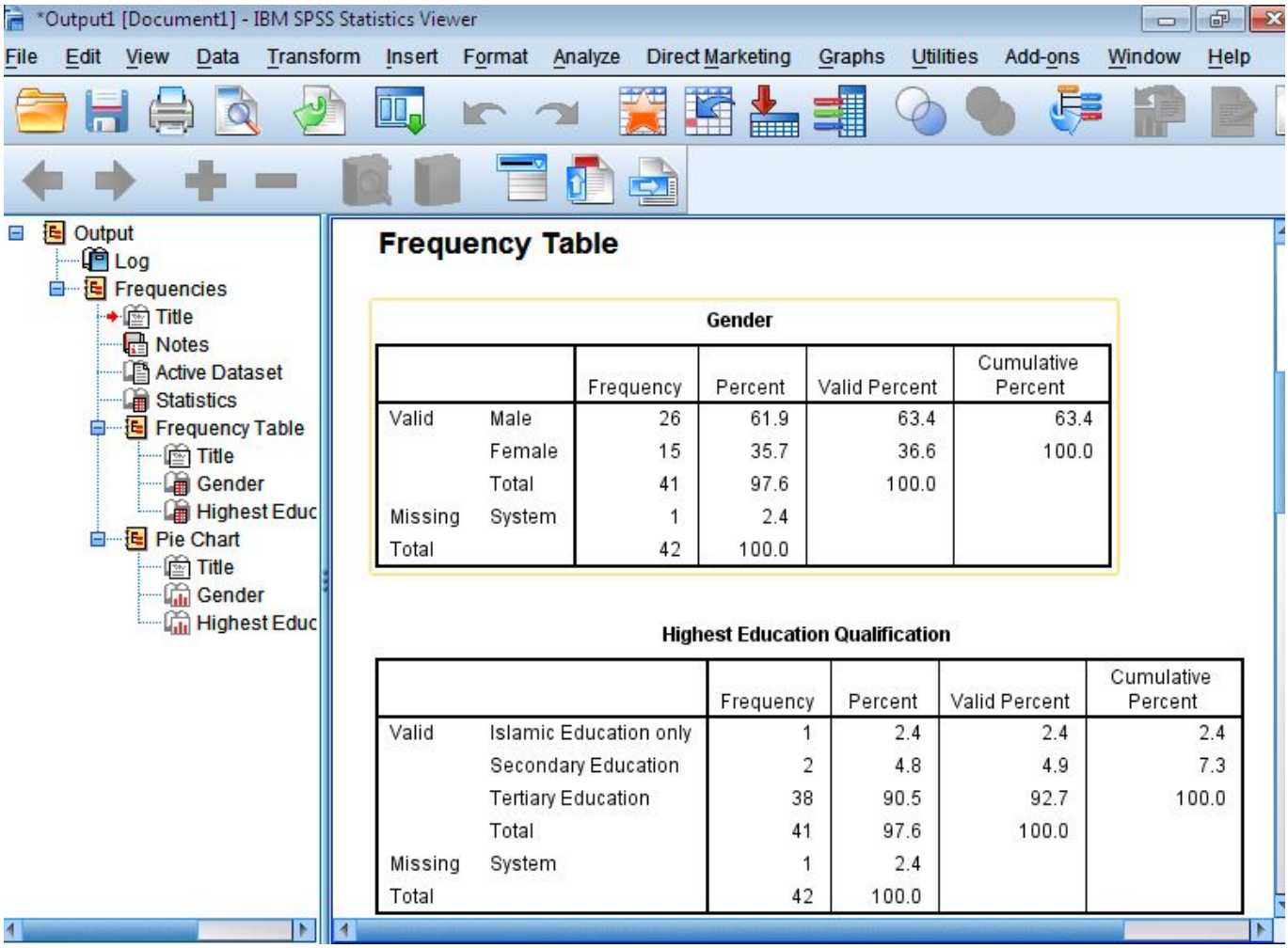
SPSS also offers the feature solution of data documentation, which allows researchers to store a meta-data dictionary. This meta-data dictionary acts as a centralized repository of information pertaining to data such as meaning, relationships to other data, origin, usage, and format.

A typical SPSS view is given by:



	SECTION_ONE	gend_1	marital_2	age_3	eduqua_4	tribe_5	specify_5	income_6	SECTW
1	.	Male	Married	39-49 years	Tertiary Ed...	Yoruba	.	No Income	
2	.	Male	Married	above 60 y...	Tertiary Ed...	Others	.	#100,000 - ...	
3	.	Male	Married	39-49 years	Secondary...	Igbo	.	#150,000 - ...	
4	.	Male	Married	above 60 y...	Tertiary Ed...	Yoruba	.	#100,000 - ...	
5	.	Male	Married	above 60 y...	Tertiary Ed...	Yoruba	.	#50,000 - #...	
6	.	Male	Married	above 60 y...	Tertiary Ed...	Yoruba	.	#150,000 - ...	
7	.	Male	Married	above 60 y...	Secondary...	Yoruba	.	above #200...	
8	.	Male	Married	50-59 years	Tertiary Ed...	Yoruba	.	#150,000 - ...	
9	.	Male	Married	50-59 years	Tertiary Ed...	Yoruba	.	#50,000 - #...	
10	.	Male	Married	39-49 years	Tertiary Ed...	Yoruba	.	#50,000 - #...	
11	.	Male	Married	50-59 years	Tertiary Ed...	Yoruba	.	#50,000 - #...	
12	.	Male	Married	39-49 years	Tertiary Ed...	Yoruba	.	above #200...	
13	.	Male	Married	50-59 years	Tertiary Ed...	Yoruba	.	No Income	
14	.	Male	Married	above 60 y...	Tertiary Ed...	Yoruba	.	above #200...	
15	.	Male	Married	above 60 y...	Tertiary Ed...	Yoruba	.	#100,000 - ...	
16	.	Male	Married	above 60 y...	Tertiary Ed...	Yoruba	.	above #200...	

A descriptive analysis of some variables is given below:



3.4.3 Python

Python is a multi-paradigm programming language. It supports object-oriented programming, structured programming, and functional programming patterns, among others. Python is an increasingly popular tool for data analysis. When it comes to data science, Python's syntax is the closest to the mathematical syntax and, therefore, is the language that is most easily understood and learned by professions like mathematicians or economists. Python is basically used for forecasting and projection in NISER. Below is a sample of codes used to forecast and project the production of rice for 4 consecutive years;

3.4.4 EVIEWS

EViews (Econometric Views) is a statistical package, used mainly for time-series oriented econometric analysis.

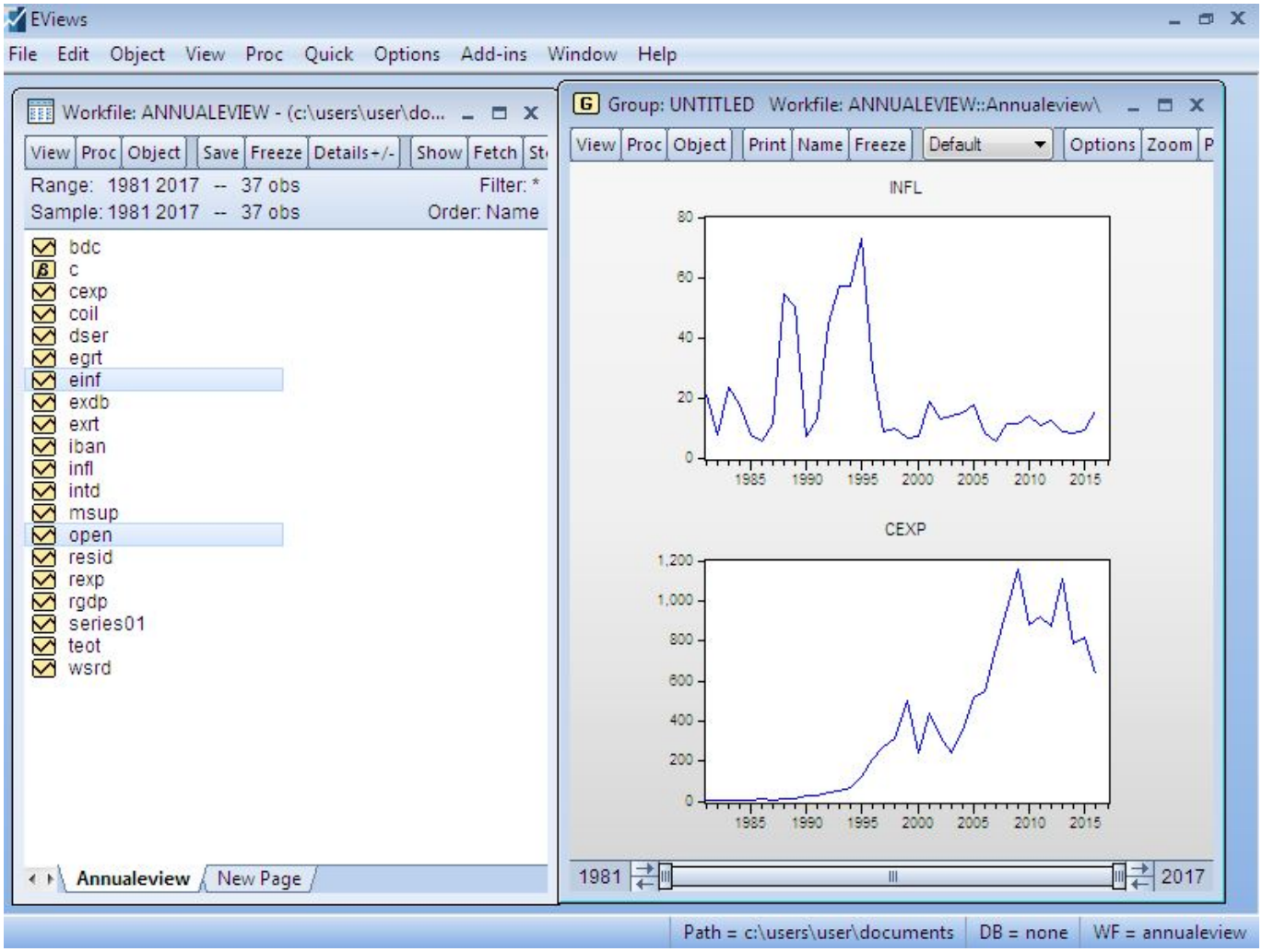
EViews can be used for general statistical analysis and econometric analyses, such as cross-section and panel data analysis and time series estimation and forecasting. EViews combines spreadsheet and relational database technology with the traditional tasks found in statistical software.

EVIEWS can be used for the following:

1. Forecasting
2. Simulation

3. Data Management
4. Estimation
5. Graphics

The picture below depicts the flow of government expenses in relation to inflation using EVIEWS:



3.4.5 MATLAB

The name MATLAB stands for matrix laboratory. MATLAB uses column-oriented analysis for multivariate statistical data. Each column in a data set represents a variable and each row an observation.

Typical uses include:

1. Math and computation
2. Algorithm development
3. Data acquisition
4. Modeling, simulation, and prototyping
5. Data analysis, exploration, and visualization
6. Scientific and engineering graphics
7. Application development, including graphical user interface building.

4 RELEVANCE OF MATHEMATICS AT NIGERIAN INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH

Basically, Economic and Business Policy Department is majorly focused on econometric (the branch of economics concerned with the use of mathematical methods in describing economic systems). The following are some of the mathematical methods used in describing economic systems:

4.1 Optimization

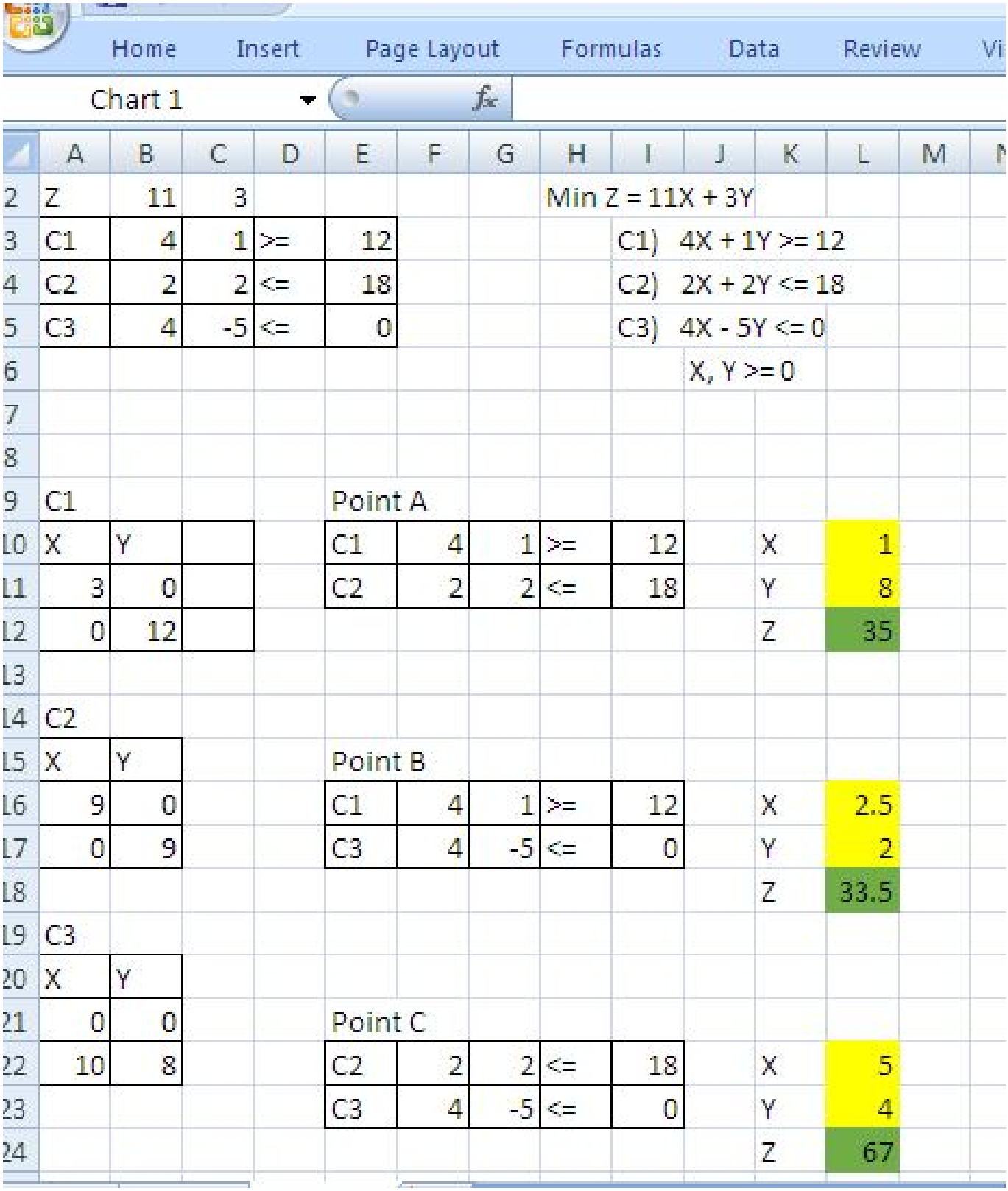
In mathematics, mathematical optimization or mathematical programming is the selection of a best element (with regard to some criterion) from some set of available alternatives. In the simplest case, an optimization problem consists of maximizing or minimizing a real function by systematically choosing input values from within an allowed set and computing the value of the function. More generally, optimization includes finding "best available" values of some objective function given a defined domain (or input), including a variety of different types of objective functions and different types of domains.

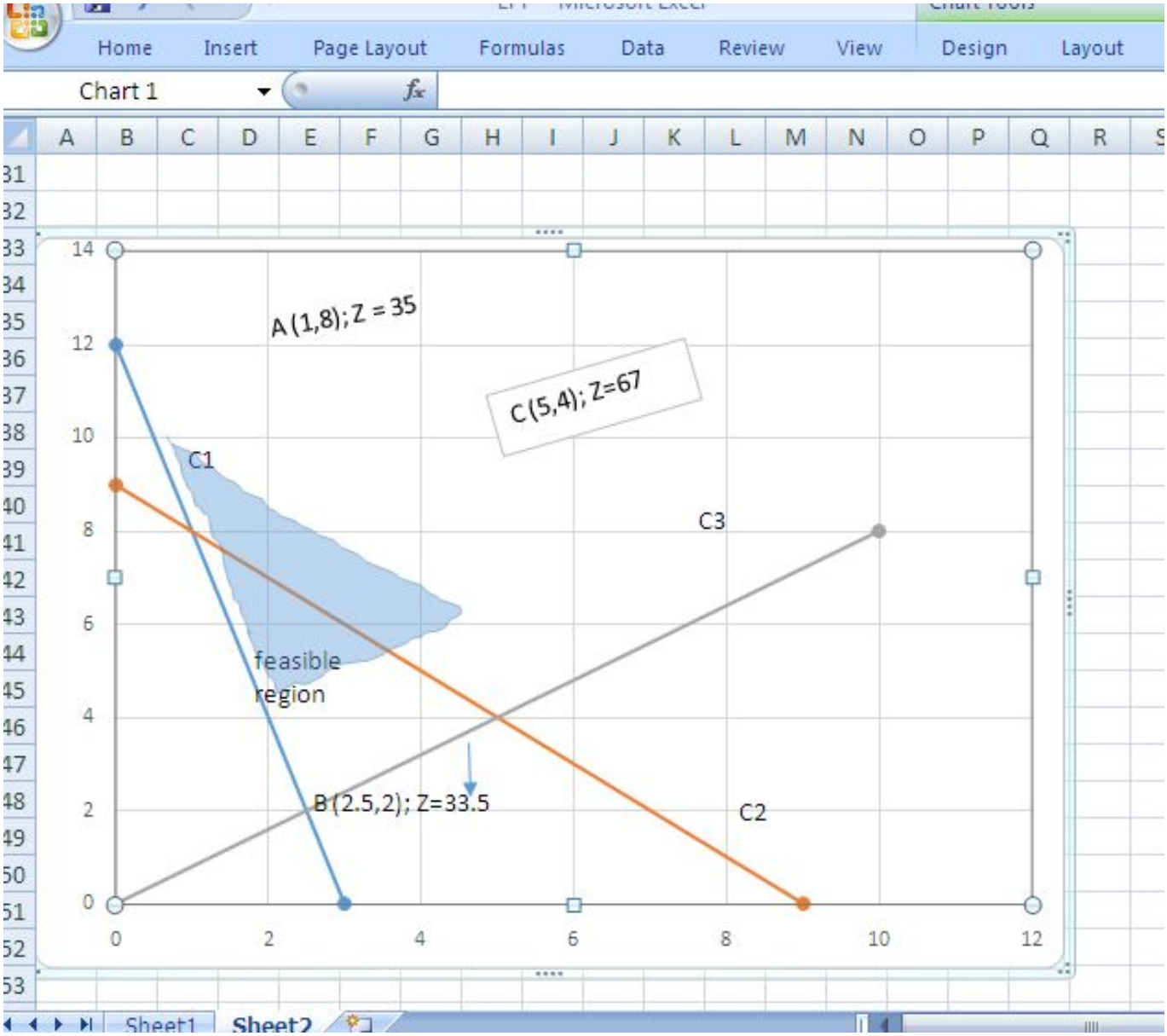
An optimization problem can be represented in the following way: given a function $f : A \to \mathbb{R}$ from some set to the real numbers we sought an element x_0 in A such that $f(x_0) \leq f(x)$ for all x in A (minimization) or such that $f(x) \leq f(x_0)$ for all x in A (maximization). Such a formulation is called an optimization problem or a mathematical programming problem.

The following are some of the methods used in solving optimization:

1. Graphical method
2. Simplex algorithm
3. Lagrange multiplier
4. The use of eigen values through Hessian matrix

The attached picture below is a graphical solution to an optimization problem:


Home Insert Page Layout Formulas Data Review Vi
Chart 1
Min Z = 11X + 3Y
C1) 4X + 1Y >= 12
C2) 2X + 2Y <= 18
C3) 4X - 5Y <= 0
X, Y >= 0
Z 11 3
C1 4 1 >= 12
C2 2 2 <= 18
C3 4 -5 <= 0
C1
X Y
3 0
0 12
C2
X Y
9 0
0 9
C3
X Y
0 0
10 8
Point A
C1 4 1 >= 12
C2 2 2 <= 18
X 1
Y 8
Z 35
Point B
C1 4 1 >= 12
C3 4 -5 <= 0
X 2.5
Y 2
Z 33.5
Point C
C2 2 2 <= 18
C3 4 -5 <= 0
X 5
Y 4
Z 67



4.2 Assignment problem

Assignment problem is a special type of linear programming problem which deals with the allocation of the various resources to the various activities on one to one basis. It does it in such a way that the cost or time involved in the process is minimum and profit or sale is maximum. Though these problems can be solved by simplex method or by transportation method but assignment model gives a simpler approach for these problems.

Suppose there are n facilitates and n jobs it is clear that in this case, there will be n assignments. Each facility or say worker can perform each job, one at a time. But there should be certain procedure by which assignment should be made so that the profit is maximized or the cost or time is minimized.

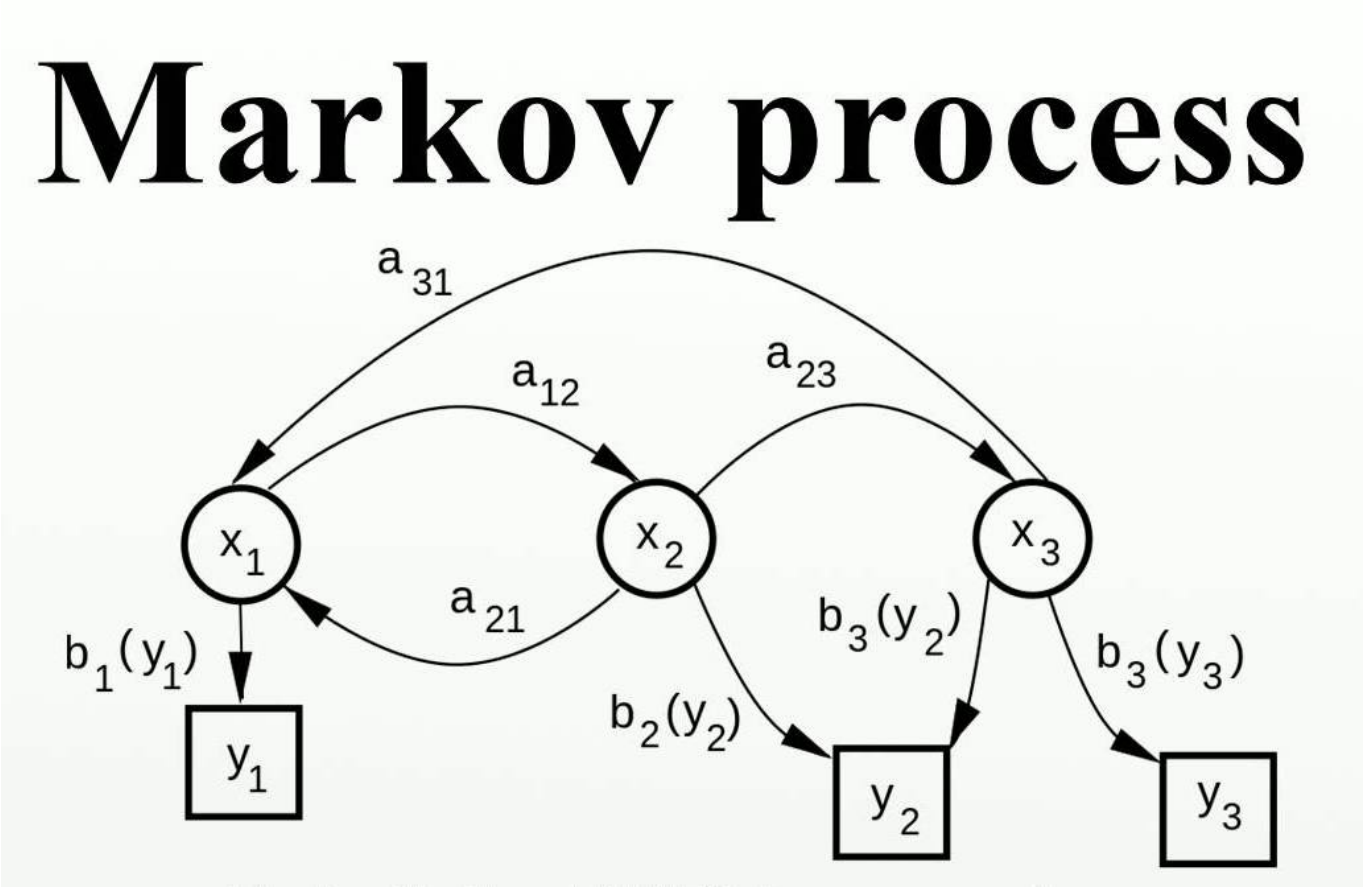
Worker	Job of Work					
	1	2	3	4	jth	n
1.	Co_{11}	Co_{12}	Co_{13}	Co_{14}	.....	Co_{m}
2.	Co_{21}	Co_{22}	Co_{23}	Co_{24}	.....	Co_{2n}
3.	Co_{31}	Co_{32}	Co_{33}	Co_{34}	.....	Co_{3n}
i^{th}				Co_{ij}		
n^{th}	Co_{n1}	Co_{n2}	Co_{n3}	Co_{n4}	.....	Co_{nm}

In the table, Co_{ij} is defined as the cost when jth job is assigned to ith worker. It maybe noted here that this is a special case of transportation problem when the number of rows is equal to number of columns.

4.3 Markov Process

A Markov process is a random process in which the future is independent of the past, given the present. Thus, Markov processes are the natural stochastic analogs of the deterministic processes described by differential and difference equations. They form one of the most important classes of random processes. An annotated diagram of Markov process is given below:

process.jpg



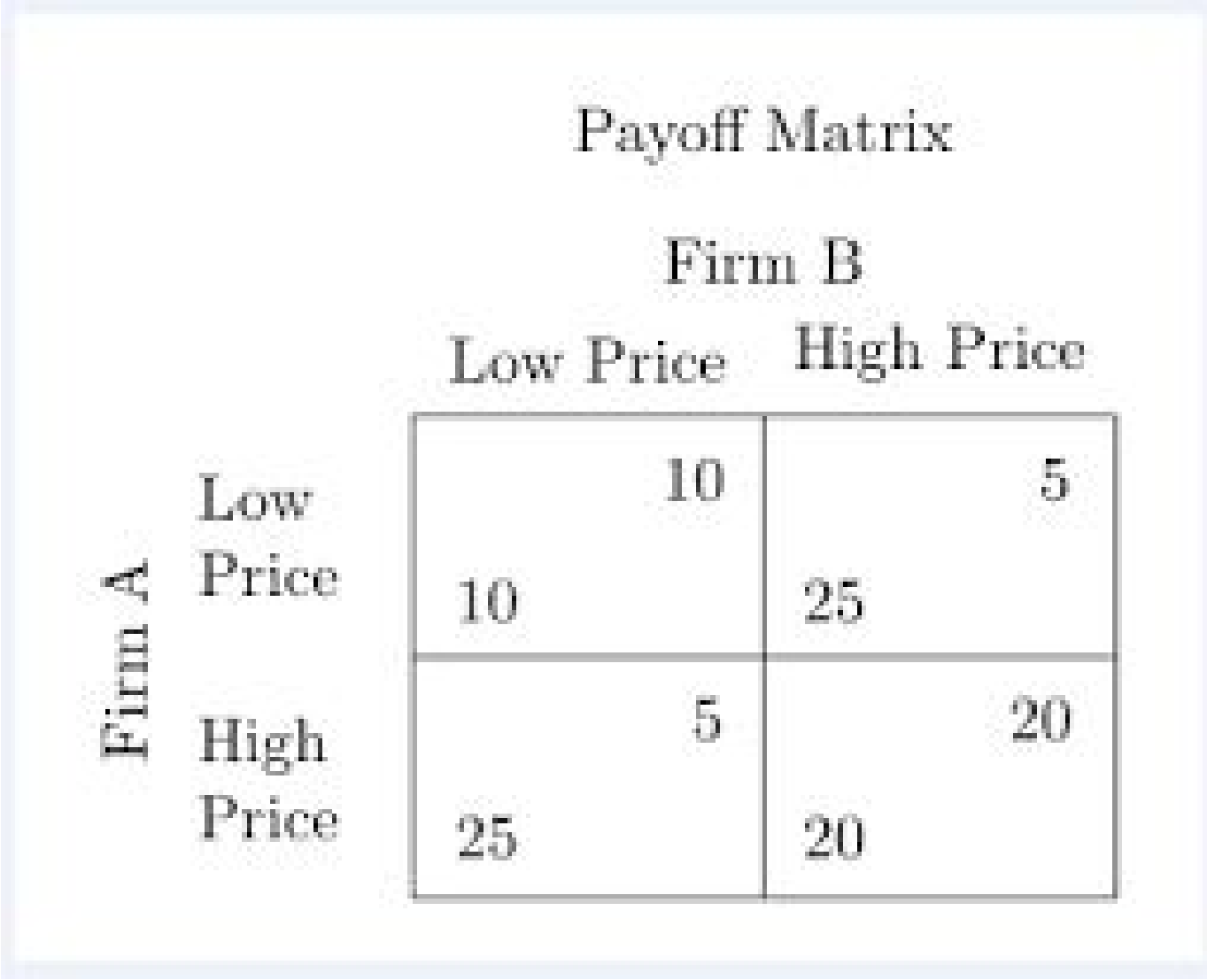
4.4 Decision Theory

Decision theory is the mathematical study of strategies for optimal decision-making between options involving different risks or expectations of gain or loss depending on the outcome.

An important aspect of decision theory is payoff matrix. A payoff matrix is a visual representation of the possible outcomes of a strategic decision. A payoff matrix includes data for opponents, strategies, and outcomes. A payoff matrix can be used to calculate the aggregate outcome and to predict a strategy using Minimax, Maximax, etc

A sample of payoff matrix is given below:

Matrix.jpg



5 CONCLUSION AND RECOMMENDATIONS

My experience during the training justified the aims and objectives of SIWES. I was able to acquire skills on various methods of using statistical tools for analysis. SIWES should be given more attention and support in order for it to do better in achieving its aims and objectives. Financial assistance should be provided to students during the training in order for them to adjust to the new environment they would find themselves. This will also allow the students to concentrate fully on their assignment during the training. The experience gained at my place of attachment was enlightening and eye opening. Majority of the procedures I was introduced to were not new theoretically, but new practically.

The analysis I did were done under supervision of the analysts, and sometimes I was left to carry out the less complicated ones on my own. The experience gained is imperative to future application and will be useful in my professional career.

5.1 Problems Encountered During the Programme

The major problem encountered at the industry was the issue of power and access to internet which delayed many of the analysis and resulted in repetition of some of the analysis. Also the lack of payment made students cultivate a nonchalant attitude towards the programme.

5.2 Suggestion for Improvement of SIWES

There should be regulation of the supervising of the students' activities if the programme should be continued. And also financial arrangement for the students transportation should be done, which will help increase the sense of responsibility of the students toward the programme.

5.3 Conclusion

Students' Industrial Work Experience Scheme (SIWES) exposed me to work experiences and skills needed to cope in labor market. SIWES provided an avenue for me to understand the practical aspects of the theories I was taught in school. I was also exposed to machineries, equipments, professional work methods and ways to safe guard the work environment in industries and various organizations.

SIWES gave me the opportunity to understand the underlying principles of mathematics, in order to make me a productive member of the society. This training also gave me the opportunity to interact, share knowledge and ideas with other students from different institutions.

The period of my six months SIWES, was really a time of exposure and enlightenment. I was able to learn some software packages used for solving mathematical problems, and I was privileged to learn some others that are needed analysis. Also this period availed me the opportunity to discover my potentials and have a better idea about my career paths.

More so, SIWES made me to appreciate the knowledge in some courses offered during school, and it also showed me easier ways of solving mathematical problems with the use of software packages. Furthermore, my period of SIWES at NISER gave me a knowledge on research and it's important in policy making.

5.4 Recommendation

My recommendations will be directed to the organizers of SIWES programs, ITF, the student and the institution.

5.4.1 Industrial Training Fund (ITF)

1. They should ensure placement for student at the stipulated time.
2. They should make monthly allowance available for students in other to bridge the financial difficulty that may arise during the course of the program
3. The duration of the program should be extended so as to make students more experienced.

5.4.2 Students

1. Nonchalant attitude towards work and learning should be discouraged among students.
2. All students going for SIWES should seek internship in an establishment with goals similar to their careers.
3. Student should prepare themselves for the technicality attached to the SIWES training, and also be a good ambassador of their institution in their place of internship.
4. Students should start surveying potential companies early so that the difficulty of finding a placement will not be a problem.
5. Moral and good behavior should be exhibited among student while undergoing the internship.

5.4.3 Institutions

The University should try to collaborate with some industries and firms in order to get easy placement for students.

6 REFERENCES

Federal Military Government (1990). Industrial Training Fund, Jos, Nigeria.

Industrial Training Fund (1973). Policy Document No 1. Industrial Training Fund, Jos.

Industrial Training Manual of University of Ibadan, Ibadan. University Printery, Ibadan.

NISER Act, Laws of The Federation of Nigeria.

Oludele A T and Mofe O J (2009). Guide to successful participation in SIWES.

7 APPENDIX I

1. All the statistical data used in this report are from Central Bank of Nigeria (CBN), National Bureau of Statistic (NBS) and World Development Indicator(WDI) database.

2. The whole of this report was typed using LaTEX and the source code will be attached as a separate file.

8 APPENDIX II