**A VALUATION REPORT**

ON THE

**STUDENT’S INDUSTRIAL WORK EXPERIENCE SCHEME**

UNDERTAKEN AT

**APPLIED ARTIFICIAL INTELLIGENCE AND ROBOTICS LABORATORY**

**Ile Ife, Osun State**

PREPARED BY

**OJO, EMMANUEL OLUBUNMI**

**EEG/2016/048**

Submitted to the Coordinator, Engineering Valuation,

**Department of Electronic and Electrical Engineering,**

**Obafemi Awolowo University, Ile-Ife**

**January, 2022**

Department of Electronic and Electrical Engineering,

Obafemi Awolowo University,

Ile-Ife, Osun State.

11th January, 2022.

The Engineering Valuation Coordinator,

Department of Electronic and Electrical Engineering,

Obafemi Awolowo University,

Ile-Ife, Osun State.

Dear Sir,

# LETTER OF TRANSMITTAL

In response to your request for an Engineering Valuation report of the facilities of Applied Artificial Intelligence and Robotics Laboratory, Ile-Ife, Osun, a research and development company where I undertook my Students Industrial Work Experience Scheme (SIWES), I hereby present a detailed report of the true worth of the afore-mentioned company.

It is expected that this report would give you all vital information you so require.

Yours faithfully,

..………………….

OJO Emmanuel Olubunmi

EEG/2016/048

# ACKNOWLEDGEMENT

I would like to express my immense gratitude to God for keeping me in good health and sound mind throughout the duration of my internship. I also want to thank my parents for their understanding and care.

I also want to thank my Supervisor/Chief Technical Officer, Applied Artificial Intelligence and Robotics Laboratory for his persistent moral and academic advice and his top-notch mentorship. May God bless you sir.

# ABSTRACT

The SIWES evaluation is a program designed to enable students studying technology/practical oriented courses to gain valuable practical experience in industries.

Six months of industrial training was done with Applied Artificial Intelligence and Robotics Laboratory, Ile-Ife, Osun, a research company that is into neuroscience, rehabilitation robotics and embedded systems design. The group has research interest in stroke rehabilitation, seizure detection and climate modelling. As part of its core areas of operation, the company designed a neuro-prostheses (NPX1) which restores upper limb functions to amputee who lost their upper limb due to accident or diseases and the company current works on a climate modelling and an embedded design project.

In chapter one, the nature of the firm’s research interests, the engineering equipment assets management approach in the company and purpose of the report was discussed.

Chapter two deals with the methods of engineering valuation as it applies to the company, the current market supply and demand of the equipment under study from internal sources.

The third chapter outlines the entire engineering equipment asset in the company, their procurement history and the valuation analysis.

In chapter four, the tables of the result obtained based on analysis from the previous chapters was discussed while conclusion and recommendation are presented in fifth chapter.

# TABLE OF CONTENTS

[[LETTER OF TRANSMITTAL ii](#_Toc34588684)](#_Toc93319116)

[[ACKNOWLEDGEMENT iii](#_Toc34588684)](#_Toc93319117)

[[ABSTRACT iv](#_Toc34588684)](#_Toc93319118)

[[TABLE OF CONTENTS v](#_Toc34588684)](#_Toc93319119)

[[LIST OF TABLES ix](#_Toc34588684)](#_Toc93319120)

[[CHAPTER ONE 1](#_Toc34588684)](#_Toc93319121)

[[INTRODUCTION 1](#_Toc34588684)](#_Toc93319122)

[[1.1 Company Profile 1](#_Toc34588684)](#_Toc93319123)

[[1.2 Nature of Research Firm’s Business 2](#_Toc34588684)](#_Toc93319124)

[[1.3 The Engineering Equipment Asset Management Approach 2](#_Toc34588684)](#_Toc93319125)

[[1.4 Objective of Study 3](#_Toc34588684)](#_Toc93319126)

[[CHAPTER TWO 5](#_Toc34588684)](#_Toc93319127)

[[LITERATURE REVIEW 5](#_Toc34588684)](#_Toc93319128)

[[2.1 Introduction to Engineering Valuation 5](#_Toc34588684)](#_Toc93319129)

[[2.2 Methods of Engineering Valuation 7](#_Toc34588684)](#_Toc93319130)

[[2.2.1 Replacement cost method 7](#_Toc34588684)](#_Toc93319131)

[[2.2.2 Depreciated replacement cost method 7](#_Toc34588684)](#_Toc93319132)

[[2.2.3 Open market valuation or disposal method 7](#_Toc34588684)](#_Toc93319133)

[[2.3 Method of Valuation Specific to the Company 8](#_Toc34588684)](#_Toc93319134)

[[2.4 Present Method in Practice in the research group 8](#_Toc34588684)](#_Toc93319135)

[[2.5 Depreciation 8](#_Toc34588684)](#_Toc93319136)

[[2.5.1 The straight-line method 9](#_Toc34588684)](#_Toc93319137)

[[2.5.2 The declining balance method 10](#_Toc34588684)](#_Toc93319138)

[[CHAPTER THREE 12](#_Toc34588684)](#_Toc93319139)

[[METHODOLOGY 12](#_Toc34588684)](#_Toc93319140)

[[3.1 List of Engineering Equipment Asset to be Evaluated 12](#_Toc34588684)](#_Toc93319141)

[[3.2 The Procurement History and Costs 12](#_Toc34588684)](#_Toc93319142)

[[3.3 Valuation Analysis 12](#_Toc34588684)](#_Toc93319143)

[[3.3.1 Valuation Computation for 12kW, 415V 3-Phase Generator 18](#_Toc34588684)](#_Toc93319144)

[[3.3.2 Valuation Computation for Hilux Truck 18](#_Toc34588684)](#_Toc93319145)

[[3.3.3 Valuation Computation for Air Conditioning System 18](#_Toc34588684)](#_Toc93319146)

[[3.3.4 Valuation Computation for 3D Printers 19](#_Toc34588684)](#_Toc93319147)

[[3.3.5 Valuation Computation for IoT Modules 19](#_Toc34588684)](#_Toc93319148)

[[3.3.6 Valuation Computation for CNC Lathe Machine 19](#_Toc34588684)](#_Toc93319149)

[[3.3.7 Valuation Computation for Laser Cutters 20](#_Toc34588684)](#_Toc93319150)

[[3.3.8 Valuation Computation for Toyota Cars 20](#_Toc34588684)](#_Toc93319151)

[[3.3.9 Valuation Computation for Switch Over Box 20](#_Toc34588684)](#_Toc93319152)

[[3.3.10 Valuation Computation for Computer Systems 21](#_Toc34588684)](#_Toc93319153)

[[3.3.11 Valuation Computation for Socket Outlets 21](#_Toc34588684)](#_Toc93319154)

[[3.3.12 Valuation Computation for Routers 21](#_Toc34588684)](#_Toc93319155)

[[3.3.13 Valuation Computation for Uninterrupted Power Supply 22](#_Toc34588684)](#_Toc93319156)

[[3.3.14 Valuation Computation for Network Cables 22](#_Toc34588684)](#_Toc93319157)

[[3.3.15 Valuation Computation for Office Cabinet 22](#_Toc34588684)](#_Toc93319158)

[[3.3.16 Valuation Computation for Louvre Plates and Fittings 23](#_Toc34588684)](#_Toc93319159)

[[3.3.17 Valuation Computation for Fluorescent Engine 23](#_Toc34588684)](#_Toc93319160)

[[3.3.18 Valuation Computation for Sensors 23](#_Toc34588684)](#_Toc93319161)

[[3.3.19 Valuation Computation for Switch Boxes 24](#_Toc34588684)](#_Toc93319162)

[[3.3.20 Valuation Computation for Development Boards 24](#_Toc34588684)](#_Toc93319163)

[[3.3.21 Valuation Computation for Microcontrollers and Processors 24](#_Toc34588684)](#_Toc93319164)

[[3.3.22 Valuation Computation for PMS 3D Printed Cases 25](#_Toc34588684)](#_Toc93319165)

[[3.3.23 Valuation Computation for LaserJet Printers 25](#_Toc34588684)](#_Toc93319166)

[[3.3.24 Valuation Computation for Scanners 25](#_Toc34588684)](#_Toc93319167)

[[3.3.25 Valuation Computation for Mechanical Toolkits 26](#_Toc34588684)](#_Toc93319168)

[[3.3.26 Valuation Computation for Solar Panels 26](#_Toc34588684)](#_Toc93319169)

[[3.3.27 Valuation Computation for Charge Controllers 26](#_Toc34588684)](#_Toc93319170)

[[3.3.28 Valuation Computation for 5KW Inverter 27](#_Toc34588684)](#_Toc93319171)

[[3.3.29 Valuation Computation for Digital Oscilloscope 27](#_Toc34588684)](#_Toc93319172)

[[3.3.30 Valuation Computation for Signal Generator 27](#_Toc34588684)](#_Toc93319173)

[[3.3.31 Valuation Computation for LED TV Sets 28](#_Toc34588684)](#_Toc93319174)

[[3.3.32 Valuation Computation for Company Phones 28](#_Toc34588684)](#_Toc93319175)

[[3.4 Limitation of Analysis 28](#_Toc34588684)](#_Toc93319176)

[[CHAPTER FOUR 30](#_Toc34588684)](#_Toc93319177)

[[RESULTS AND DISCUSSION 30](#_Toc34588684)](#_Toc93319178)

[[CHAPTER FIVE 34](#_Toc34588684)](#_Toc93319179)

[[CONCLUSIONS AND RECOMMENDATIONS 34](#_Toc34588684)](#_Toc93319180)

[[5.1 Conclusion 34](#_Toc34588684)](#_Toc93319181)

[[5.2 Recommendation 34](#_Toc34588684)](#_Toc93319182)

[[REFERENCES 35](#_Toc34588684)](#_Toc93319183)

[ii](#_Toc34588684)

# LIST OF TABLES

Table 3.1: List of Company assets to be Valued 11

Table 3.2: Procurement History of Assets to be Valued 13

Table 4.1: Analysis Results 25

# CHAPTER ONE

# INTRODUCTION

## 1.1 Company Profile

Applied Artificial Intelligence and Robotics Laboratory, was founded by K. P. Ayodele (PhD.), a senior lecturer in the department of Electronic and Electrical Engineering, Faculty of Technology, Obafemi Awolowo University, Ile-Ife, Osun. The company is basically a research firm with interests in neuroscience, rehabilitation robotics and medical instrumentation. The research firm is creating a niche between medical sciences and electronic engineering.

The research firm contains eight research assistants and the founder which also serves as the principal investigator.

The research group have worked on various projects which includes the following:

* Neuroprostheses I (NPX I) for Amputees.
* Neuroprostheses II (NPX II) for Amputees.
* Platform for Upper Limb Stroke Rehabilitation (PULSR) for stroke patients.
* Brain controlled wheel chair for stroke patients.
* Orthotic hand for stroke rehabilitation.
* Robotic glove for stroke rehabilitation.
* Research in epileptic seizure detection.
* Research in low cost weather station for Africa.

## 1.2 Nature of Research Firm’s Business

Applied Artificial Intelligence and Robotics Laboratory is a start-up research firm with limited number of researchers and drive to become one of the major players in the neuroscience and IoT world, this keeps all the all the researchers and interns on their toes, and working round the clock. The firm is into research on how to integrate new technologies in rehabilitation robotics and artificial intelligence to products and get better result and also working with various open-source projects to support the processing engine handling large stream of data being transmitted by their devices.

## 1.3 The Engineering Equipment Asset Management Approach

Asset Management helps to identify how an industrial organization deals with the management of its physical assets through their life cycle to achieve its strategy. It could be defined as the system that controls and plans the asset-related activities and their relationships to ensure the asset performance that meets the intended competitive strategy of the organization.

At Applied Artificial Intelligence and Robotics Laboratory, the engineering equipment asset management approach used is the Total productive management (TPM) which is a system of maintaining and improving the integrity of production and quality systems through the machines, equipment, processes and employees that add business value to an organization. TPM focuses on keeping all equipment in top working condition to avoid breakdowns and delays in manufacturing processes.

One of the main objectives of TPM is to increase the productivity of plant and equipment with a modest investment in maintenance. In order for TPM to be effective, the full support of the total workforce is required. This should result in accomplishing the goal of TPM: “Enhance the volume of the production, employee morale and job satisfaction.”

The main objective of TPM is to increase the overall equipment effectiveness (OEE) of plant equipment. TPM addresses the causes for accelerated deterioration while creating the correct environment between operators and equipment to create ownership.

The objective is to identify then prioritize and eliminate the causes of the losses. This is done by self-managing teams that solve problem. Employing consultants to create this culture as a common practice. The seven pillars of TPM are mostly focused on proactive and preventive techniques for improving equipment reliability:

1. Training and education
2. Cost deployment
3. Quality maintenance
4. Planned maintenance
5. Early equipment management
6. Focused improvement
7. Autonomous maintenance

## 1.4 Objective of Study

The objective of this report is to determine the current market value of Applied Artificial Intelligence and Robotics Laboratory, Ile Ife, Osun State. And to also provide useful record that can help in decision making for future company requirement and familiarization with the art of engineering valuation.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction to Engineering Valuation

Engineering Valuation is a branch of Engineering that deals with the determination of the present value of engineering equipment and machinery for disposal or other purposes. It is the application of engineering or mathematical analysis and synthesis to making economic decisions. Machinery and equipment are an important part of an asset intensive business. Knowing how much the machinery and equipment are worth will determine the amount of goodwill that consumers are paying for as part of the overall purchase price. Having in mind that values can differ depending upon specific circumstances.

According to Richmond (1994), Surveyors will be employed whenever activities involve land, construction or property. They may be members of the Royal Institution of Chartered Surveyors and/or the Incorporated Society of Valuers and Auctioneers. Also, according to Massari et al (2016), in order to evaluate an enterprise or an acquisition, an analyst does not depend on the quantity of the previous valuations carried-out but on the quality of work done.

The economic decisions you will be expected to take in the valuation of an asset may not necessarily be to determine costs or go for the cheapest alternative, but to base the economic decisions on the totality of the asset being valued in time and space in one hand and in usage on the other hand. In which case, the valuer would take a look at the reason for valuation and select the best of possible options/routes in arriving at the cost of an asset.

Two good uses for Engineering Valuation are:

* Financial Purpose: The financial purposes usually include the need for budgeting and estimating profits in a company or holding/establishment for tax and/or record purposes (for processing a loan for instance) and valuating an asset for disposal purpose. Without a proper appraisal of the value of each equipment or asset great financial loss may be brought to a client. Where a valuation is being prepared for tax purposes or to report to shareholders, there is the need for Cost Segregation Studies (CSS) a new branch of valuation.
* Insurance Purpose: This is the valuation usually commissioned by an Insurance broker firm or even an individual to know the worth of an asset intended to be insured. There are many reasons for insuring an asset. An equipment or vehicle may be insured against theft or damage. The type of insurance is usually comprehensive and this is traditionally 10% of the PW value of the asset. The method of valuation for this is the Replacement Cost method.

According to Blackledge (2009), property valuers have to possess and be competent in a diverse range of skills such as:

* Research models
* Calculation
* Measurement
* Report writing
* Negotiation
* Management and business finance
* A working knowledge of economics and politics
* A knowledge of building construction
* An awareness of environmental issues

## 2.2 Methods of Engineering Valuation

### 2.2.1 Replacement cost method

The valuation for insurance purpose involves the establishment of the current cost of replacing the asset as new. If the asset is imported the replacement cost is estimated from the sum of the current ex-works price, the freight cost, and cost of transit insurance, port charges, custom charges, clearing agent charge, transportation charges and installation charges. The valuer needs to know the current exchange rate and government charges for the imported machinery.

### 2.2.2 Depreciated replacement cost method

This involves a two-stage operation of first estimating the equipment as new and then depreciating the value obtained to make allowance for wear and tear, age and obsolesce. The rate of depreciation is determined from the unexpired economic life of the plant and the gross current replacement cost. The value obtained is known as the existing use value (EUV) or Book Value (BV) and are economic values, which must reflect the economical production of service capacity of the machine, rather than the cost of replacing the physical entity as in the case of valuation for insurance.

### 2.2.3 Open market valuation or disposal method

The exchange of hands in the disposal of a facility may happen in two ways:

* The change of hands may not involve change of position or location and the plant remains in-situ.
* The sale may require a relocation of the plant to another town or country.

## 2.3 Method of Valuation Specific to the Company

The method of valuation specific to the engineering equipment assets of the company under study is the Depreciated replacement cost method. This method is well explained in section 2.2.2 of this report.

## 2.4 Present Method in Practice in the research group

The research firm is a start-up and is not yet involved in depreciation activities. Therefore, there is no method in use currently at the group.

## 2.5 Depreciation

Depreciation may be defined as method of spreading the cost of a fixed asset over the life expected years of use of the asset (Fajobi, 2012). It is the decrease in the value of physical properties with the passage of time. A depreciable asset is one used in a business to produce income. Different kinds of assets can depreciate over time e.g., machinery, buildings, vehicles, patents, copyrights, furniture, and equipment. The fact that depreciation does occur is easily established and recognized, the determination of its magnitude in advance is not easy. The actual amount of depreciation can never be established until the asset is retired from service. Additionally, depreciable asset may be classified as personal assets such as machinery or equipment, and real assets namely land and generally anything that is erected on, growing on, or attached to the land. However, land itself is never depreciable.

There are many methods of calculating depreciation. Two major methods are the MACRS system and the alternative MACRS method. The methods use the concept of service life to determine the rate of depreciation. The methods used in computing the appropriate rates include the straight-line method, the declining balance method and a third method which is actually a combination of the two methods.

Depreciation has several causes some of which are very difficult to predict or anticipate. It can be broadly classified as follows:

1. Normal depreciation
2. Physical
3. Functional
4. Depreciation due to changes in price level

Some methods of calculating depreciation are explained below:

### 2.5.1 The Straight-line method

The straight-line method of computing depreciation assumes that the loss in the value is directly proportional to the age of the asset. The equations shown below are used in the calculation of the straight-line method.

…………………………………2.1

…………………...…………… 2.2

…………………….……...……… 2.3

Where,

* N = depreciable life of the asset in years;
* B = Unadjusted cost basis;
* dk = annual depreciation deduction in the kth year (1<k<N);
* BVk = book value at the end of year k;
* S = salvage value at the end of depreciable life of the asset;
* Dk = cumulative depreciation through year k;

### 2.5.2 The Declining balance method

In the declining line method, sometimes called constant percentage method or the Matheson formula, it is assumed that the cost of depreciation is a fixed percentage of the book value at the beginning of the year (Koya et al, 2009). The ratio depreciation in any one year to the book value at the beginning of the year is constant throughout the life of the asset and is designated by R (0<R<1). In this method R = 2/N when for example a 200% declining balance is being used, and N equals the depreciable life of an asset. The following relationships hold for this method.

……………………………….…. .2.4

………………………...2.5

………………………...2.6

……………………………..2.7

……………………………2.8

# CHAPTER THREE

# METHODOLOGY

This chapter contains the details of the engineering valuation procedures carried out in the research firm. It entails all the facts, figures and tools that were of great importance in the valuation study.

## 3.1 List of Engineering Equipment Asset to be Evaluated

The hardware section of the Applied Artificial Intelligence and Robotics Laboratory would be evaluated with performance of appraisal on individual pieces of equipment, machinery etc. Table 3.1 contains the assets in the company to be evaluated.

## 3.2 The Procurement History and Costs

This chapter expatiates on the equipment to be valued. It shows the date of purchase and the cost as at time of purchase in a tabular form. The procurement history and costs are shown in table 3.2.

## 3.3 Valuation Analysis

The straight-line method for calculating depreciation is used in this analysis as discusses in section 2.5.1 of this report. Each asset is taken one after the order and analysed. It should be noted that all the computations in this section are in Naira.

|  |  |  |
| --- | --- | --- |
| Table 3.1 List of Company assets to be Valued | | |
| S/N | ASSET | QUANTITY |
| 1 | 12kW, 415V 3-Phase Generator | 1 |
| 2 | Fluorescent Tube | 9 |
| 3 | Air Conditioner | 5 |
| 4 | Switch Over Box | 1 |
| 5 | Computer Systems | 4 |
| 6 | HILUX Truck | 1 |
| 7 | Socket Outlets | 30 |
| 8 | Routers | 4 |
| 9 | Uninterrupted Power Supply | 8 |
| 10 | Network Cables (5 yards per cable) | 40 |
| 11 | Office cabinet (A set containing stools, long tables and short tables.) | 25 |
| 12 | Louvre plate and fittings | 50 |
| 13 | Fluorescent Engine | 12 |
| 14 | Sensors | 50 |
| 15 | CNC Machine | 1 |
| 16 | Switches Boxes | 3 |
| 17 | 3D printers | 2 |
| 18 | IoT Modules | 20 |
| 19 | Development Boards | 10 |
| Table 3.1 List of Company Assets to be Valued (cont’d) | | |
| S/N | ASSET | QUANTITY |
| 20 | Micro-controllers and Processors | 50 |
| 21 | Laser Cutter and Soldering Machines | 2 |
| 22 | PMS 3D printed cases | 20 |
| 23 | Toyota Cars | 2 |
| 24 | Installed Power Monitoring Systems | 7 |
| 25 | LaserJet Printers | 3 |
| 26 | Scanners | 2 |
| 27 | Mechanical Toolkits | 4 |
| 28 | Solar Panels | 12 |
| 29 | Charge Controllers | 3 |
| 30 | 5KW Inverter | 1 |
| 31 | 12V lead Acid Accumulator | 4 |
| 32 | Digital Oscilloscope | 1 |
| 33 | Signal Generator | 1 |
| 34 | Network Analyser | 1 |
| 35 | LED TV sets | 2 |
| 36 | Company phones | 3 |
| 37 | Sensor Calibration Kit | 1 |

Table 3.2 Procurement History of Assets to be Valued

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | ASSETS | YEAR OF PROCUREMENT | UNIT PRICE (#) |
|  | 12kW, 415V 3-Phase Generator | 2013 | 2,500,000 |
|  | Fluorescent Tube | 2013 | 500 |
|  | Air Conditioner | 2013 | 110,000 |
|  | Switch Over Box | 2013 | 60,000 |
|  | Computer Systems | 2013 | 95,000 |
|  | Socket Outlets | 2013 | 500 |
|  | Routers | 2013 | 15,000 |
|  | Uninterrupted Power Supply | 2014 | 50,000 |
|  | Network Cables (5 yards per cable) | 2013 | 1000 |
|  | Office cabinet (A set containing stools, long tables and short tables.) | 2013 | 60000 |
|  | Louvre plate and fittings | 2013 | 8000 |
|  | Fluorescent Engine | 2013 | 200 |
|  | Sensors | 2013 | 5000 |
|  | CNC Machine | 2016 | 400,000 |
|  | Switches Boxes | 2013 | 500 |
|  | 3D printers | 2015 | 500,000 |
|  | IoT Modules | 2014 | 8000 |
|  | Development Boards | 2013 | 5000 |
|  |  |  |  |
|  | | | |
|  | | | |
| Table 3.2 Procurement History of Assets to be Valued (cont’d) | | | |
| S/N | ASSETS | YEAR OF PROCUREMENT | UNIT PRICE (#) |
| 20 | Micro-controllers and Processors | 2013 | 500 |
| 21 | Laser Cutter and Soldering Machines | 2013 | 17,500 |
| 22 | PMS 3D printed cases | 2015 | 20,000 |
| 23 | Toyota Cars | 2013 | 3,750,000 |
| 24 | LaserJet Printers | 2013 | 60,000 |
| 25 | Scanners | 2014 | 24,000 |
| 26 | Mechanical Toolkits | 2013 | 50,000 |
| 27 | Solar Panels | 2016 | 40,000 |
| 28 | Charge Controllers | 2016 | 20,000 |
| 29 | 5KW Inverter | 2013 | 200,000 |
| 30 | Digital Oscilloscope | 2014 | 250,000 |
| 31 | Signal Generator | 2014 | 150,000 |
| 32 | LED TV sets | 2013 | 110,000 |
| 33 | Hilux Truck | 2007 | 3,200,000 |
| 34 | Company phones | 2013 | 15,000 |

### 3.3.1 Valuation Computation for 12kW, 415V 3-Phase Generator

B = #2,500,000 S = #300,000 N = 20 K = 4



Dk = dk x K = 110,000 x 4 = #440,000

BVk = B - Dk = 2,500,000 – 440,000 = #2,060,000

### 3.3.2 Valuation Computation for Hilux Truck

B = #3,200,000 S = #450,000 N = 15 K = 10



Dk = dk x K = 183,330 x 10 = #1,833,300

BVk = B - Dk = 3,200,000 – 1,833,300 = #1,366,700

### 3.3.3 Valuation Computation for Air Conditioning System

B = #550,000 S = #100,000 N = 20 K = 4



Dk = dk x K = 22,500 x 4 = #90,000

BVk = B - Dk = 550,000 – 90,000 = #460,000

### 3.3.4 Valuation Computation for 3D Printers

B = #1,000,000 S = #200,000 N = 20 K = 2



Dk = dk x K = 40,000 x 2 = #80,000

BVk = B - Dk = 1,000,000 – 80,000 = #920,000

### 3.3.5 Valuation Computation for IoT Modules

B = #160,000 S = #20,000 N = 20 K = 3



Dk = dk x K = 70,000 x 3 = #21,000

BVk = B - Dk = 160,000 – 21,000 = #139,000

### 3.3.6 Valuation Computation for CNC Lathe Machine

B = #400,000 S = #50,000 N = 20 K = 1



Dk = dk x K = 17,500 x 1 = #17,500

BVk = B - Dk = 400,000 – 17,500 = #382,500

### 3.3.7 Valuation Computation for Laser Cutters

B = #35,000 S = #5,000 N = 20 K = 4



Dk = dk x K = 1,500 x 4 = #6,000

BVk = B - Dk = 35,000 – 6,000 = #29,000

### 3.3.8 Valuation Computation for Toyota Cars

B = #7,500,000 S = #2,000,000 N = 15 K = 4



Dk = dk x K = 366,660 x 4 = #1,466,640

BVk = B - Dk = 7,500,000 – 1,466,640 = #6,033,360

### 3.3.9 Valuation Computation for Switch Over Box

B = #60,000 S = #5,000 N = 25 K = 4



Dk = dk x K = 2,200 x 4 = #8,800

BVk = B - Dk = 60,000 – 8,800 = #51,200

### 3.3.10 Valuation Computation for Computer Systems

B = #380,000 S = #50,000 N = 20 K = 4



Dk = dk x K = 16,500 x 4 = #66,000

BVk = B - Dk = 380,000 – 66,000 = #314,000

### 3.3.11 Valuation Computation for Socket Outlets

B = #15,000 S = #3,000 N = 30 K = 4



Dk = dk x K = 400 x 4 = #1,600

BVk = B - Dk = 15,000 – 1,600 = #13,400

### 3.3.12 Valuation Computation for Routers

B = #60,000 S = #10,000 N = 25 K = 4



Dk = dk x K = 2,000 x 4 = #8,000

BVk = B - Dk = 60,000 – 8,000 = #52,000

### 3.3.13 Valuation Computation for Uninterrupted Power Supply

B = #400,000 S = #50,000 N = 10 K = 3



Dk = dk x K = 35,000 x 3 = #105,000

BVk = B - Dk = 400,000 – 105,000 = #295,000

### 3.3.14 Valuation Computation for Network Cables

B = #40,000 S = #10,000 N = 30 K = 4



Dk = dk x K = 1,000 x 4 = #4,000

BVk = B - Dk = 40,000 – 4,000 = #36,000

### 3.3.15 Valuation Computation for Office Cabinet

B = #1,500,000 S = #300,000 N = 20 K = 4



Dk = dk x K = 60,000 x 4 = #240,000

BVk = B - Dk = 1,500,000 – 240,000 = #1,260,000

### 3.3.16 Valuation Computation for Louvre Plates and Fittings

B = #400,000 S = #200,000 N = 40 K = 4



Dk = dk x K = 5,000 x 4 = #20,000

BVk = B - Dk = 400,000 – 20,000 = #380,000

### 3.3.17 Valuation Computation for Fluorescent Engine

B = #2,400 S = #400 N = 5 K = 4



Dk = dk x K = 400 x 4 = #1,600

BVk = B - Dk = 2,400 – 1,600 = #800

### 3.3.18 Valuation Computation for Sensors

B = #250,000 S = #50,000 N = 20 K = 4



Dk = dk x K = 10,000 x 4 = #40,000

BVk = B - Dk = 250,000 – 40,000 = #210,000

### 3.3.19 Valuation Computation for Switch Boxes

B = #1,500 S = #300 N = 30 K = 4



Dk = dk x K = 40 x 4 = #160

BVk = B - Dk = 1,500 – 160 = #1,340

### 3.3.20 Valuation Computation for Development Boards

B = #50,000 S = #10,000 N = 20 K = 4



Dk = dk x K = 2,000 x 4 = #8,000

BVk = B - Dk = 50,000 – 8,000 = #42,000

### 3.3.21 Valuation Computation for Microcontrollers and Processors

B = #25,000 S = #10,000 N = 30 K = 4



Dk = dk x K = 500 x 4 = #2,000

BVk = B - Dk = 25,000 – 2,000 = #23,000

### 3.3.22 Valuation Computation for PMS 3D Printed Cases

B = #400,000 S = #100,000 N = 30 K = 2



Dk = dk x K = 10,000 x 2 = #20,000

BVk = B - Dk = 400,000 – 20,000 = #380,000

### 3.3.23 Valuation Computation for LaserJet Printers

B = #180,000 S = #30,000 N = 10 K = 4



Dk = dk x K = 15,000 x 4 = #60,000

BVk = B - Dk = 180,000 – 60,000 = #120,000

### 3.3.24 Valuation Computation for Scanners

B = #48,000 S = #8,000 N = 20 K = 3



Dk = dk x K = 1000 x 3 = #3,000

BVk = B - Dk = 48,000 – 3,000 = #45,000

### 3.3.25 Valuation Computation for Mechanical Toolkits

B = #200,000 S = #40,000 N = 40 K = 4



Dk = dk x K = 4,000 x 4 = #16,000

BVk = B - Dk = 200,000 – 16,000 = #184,000

### 3.3.26 Valuation Computation for Solar Panels

B = #480,000 S = #40,000 N = 20 K = 1



Dk = dk x K = 22,000 x 1 = #22,000

BVk = B - Dk = 480,000 – 22,000 = #458,000

### 3.3.27 Valuation Computation for Charge Controllers

B = #60,000 S = #10,000 N = 25 K = 1



Dk = dk x K = 2,000 x 1 = #2,000

BVk = B - Dk = 60,000 – 2,000 = #58,000

### 3.3.28 Valuation Computation for 5KW Inverter

B = #200,000 S = #40,000 N = 20 K = 4



Dk = dk x K = 8,000 x 4 = #32,000

BVk = B - Dk = 200,000 – 32,000 = #168,000

### 3.3.29 Valuation Computation for Digital Oscilloscope

B = #250,000 S = #50,000 N = 25 K = 3



Dk = dk x K = 8,000 x 3 = #24,000

BVk = B - Dk = 250,000 – 24,000 = #226,000

### 3.3.30 Valuation Computation for Signal Generator

B = #150,000 S = #50,000 N = 25 K = 3



Dk = dk x K = 4,000 x 3 = #12,000

BVk = B - Dk = 150,000 – 12,000 = #138,000

### 3.3.31 Valuation Computation for LED TV Sets

B = #220,000 S = #40,000 N = 20 K = 4



Dk = dk x K = 9,000 x 4 = #36,000

BVk = B - Dk = 220,000 – 36,000 = #184,000

### 3.3.32 Valuation Computation for Company Phones

B = #45,000 S = #15,000 N = 10 K = 4



Dk = dk x K = 3,000 x 4 = #12,000

BVk = B - Dk = 45,000 – 12,000 = #33,000

## 3.4 Limitation of Analysis

Some of the limitations are:

* Assumptions of prices of some items whose prices could not be obtained
* Assumption that all the assets were bought new.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

The detailed result of the analysis done in chapter three is outlined in table 4.1. It contains the estimates of the calculated values.

Having carried out the valuation of Applied Artificial Intelligence and Robotics Laboratory, I am of the opinion that the ‘Existing Use Value’ of any unexpired interest in the assets is fifteen million, one hundred and fifty-six thousand, six hundred (#15,156,600). To arrive at the above-mentioned value, the following assumptions were made:

1. Every item installed within a year is assumed to have a depreciation year of one.
2. Items whose prices cannot be obtained were assumed.
3. All the items were bought new

Table 4.1: Analysis Results

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S/N | ASSET | QUANTITY | YEAR OF PROCUREMENT | UNIT PRICE (#) | TOTAL DEPRECIATION RATE (#/YR) | TOTAL BOOK VALUE BVK (#) |
| 1 | 12kW, 415V 3-Phase Generator | 1 | 2013 | 2,500,000 | 110,000 | 2,060,000 |
| 2 | Hilux truck | 1 | 2007 | 3,200,000 | 183,330 | 460,000 |
| 3 | Air conditioning system | 5 | 2013 | 110,000 | 22,500 | 460,000 |
| 4 | 3D printers | 2 | 2015 | 500,000 | 40,000 | 920,000 |
| 5 | IoT modules | 20 | 2014 | 8,000 | 7,000 | 139,000 |
| 6 | CNC lathe machine | 1 | 2016 | 400,000 | 17,500 | 382,500 |
| 7 | Laser cutters | 2 | 2013 | 17,500 | 1,500 | 29,000 |
| 8 | Toyota cars | 2 | 2013 | 3,750,000 | 1,466,640 | 6,033,360 |
| 9 | Switch over box | 1 | 2013 | 60,000 | 8,800 | 51,200 |
| 10 | Computer systems | 4 | 2013 | 95,000 | 16,500 | 314,000 |
| 11 | Socket outlets | 30 | 2013 | 500 | 400 | 13,400 |
| 12 | Routers | 4 | 2013 | 15,000 | 2,000 | 52,000 |
| 13 | Uninterrupted Power Supply | 8 | 2014 | 50,000 | 35,000 | 295,000 |
| 14 | Network cables | 40 | 2013 | 1,000 | 1,000 | 36,000 |
| 15 | Office cabinet | 25 | 2013 | 60,000 | 60,000 | 1,260,000 |
| 16 | Louvre plates and fittings | 50 | 2013 | 8,000 | 5,000 | 380,000 |
| 17 | Fluorescent engine | 12 | 2013 | 200 | 400 | 800 |
|  | | | | | | |
| Table 4.1 Analysis Results (cont’d) | | | | | | |
| S/N | ASSET | QUANTITY | YEAR OF PROCUREMENT | UNIT PRICE (#) | TOTAL DEPRECIATION RATE (#/YR) | TOTAL BOOK VALUE BVK (#) |
| 18 | Sensors | 50 | 2013 | 5,000 | 10,000 | 210,000 |
| 19 | Switch boxes | 3 | 2013 | 500 | 40 | 1,340 |
| 20 | Development boards | 10 | 2013 | 5,000 | 2,000 | 42,000 |
| 21 | Microcontrollers and processors | 50 | 2013 | 500 | 500 | 23,000 |
| 22 | PMS 3d printed cases | 20 | 2015 | 20,000 | 10,000 | 380,000 |
| 23 | LaserJet printers | 3 | 2013 | 60,000 | 15,000 | 120,000 |
| 24 | Scanners | 2 | 2014 | 24,000 | 1,000 | 45,000 |
| 25 | Mechanical toolkits | 4 | 2013 | 50,000 | 4,000 | 184,000 |
| 26 | Solar panels | 12 | 2016 | 40,000 | 22,000 | 458,000 |
| 27 | Charge controllers | 3 | 2016 | 20,000 | 2,000 | 58,000 |
| 28 | 5KW inverter | 1 | 2013 | 200,000 | 8,000 | 168,000 |
| 29 | Digital oscilloscope | 1 | 2014 | 250,000 | 8,000 | 226,000 |
| 30 | Signal generator | 1 | 2014 | 150,000 | 4,000 | 138,000 |
| 31 | LED TV sets | 2 | 2013 | 110,000 | 9,000 | 184,000 |
| 32 | Company phones | 3 | 2013 | 15,000 | 3,000 | 33,000 |
|  |  |  |  |  |  | 15,156,600 |

# CHAPTER FIVE

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Conclusion

Having considered the various assets owned by the company, the true present worth of the company as an ongoing business for the past 3 years is valued to be 6,207,640 Naira.

This value refers the fair value of the establishment, considering the fact that most of the assets are yet to reach half of their service lives.

Also, owing to the defined program of both preventive and corrective maintenance, the right operating condition and environment duly ensured for the indoor devices, for instance, the well air-conditioned 3D printer and CNC machine room; all of this lends credence to the reasonableness of the result of the valuation arrived at.

## 5.2 Recommendation

The introduction of this course into the University’s academic curriculum for the Faculty of Technology has availed me the vast opportunity of appreciating the need to place value on my asset over time. It also exposed me to another field of engineering practice which overtime had been dominated by other professionals who lack the competence of valuing Engineering assets.

# REFERENCES

Blackledge, M. (2009). *Introducing Property Valuation.* New York: Routledge.

Fajobi, O. (2012). Depreciation of Assets. *Unpublished Lecture Note on Engineering Valuation*. Ile-Ife: Department of Civil Engoneering, Obafemi Awolowo University.

Koya, J., Ogedengbe, M. O., & Omobuwajo, T. (2003). Estimation of Lives and Depreciation. In T. Koya, & J. Oladejo, *Engineering Valuation.* Ibadan: Publishers House.

Massari, M., Gianfrate, G., & Zanettin, L. (2016). *Corporate Valuation: Measuring the Value of Companies in Turbulent Times.* New Jersey: Wiley & Sons Inc.

Richmond, D. (1994). *Introduction to Valuation.* London: Macmillan Press LTD.