**THE PRESENTATION OF NON – NUMERICAL FREQUENCY DISTRIBUTIONS**

**1 Non Numeric frequency distributions**

The non numeric frequency distributions are similar to the numeric frequency distribution except that their classes are qualitative and not quantitative.

**Illustration**

**Qualitative data**

|  |  |
| --- | --- |
| **Major field** | **No. of Employees** |
| Marketing  Accounting  Management  Finance  Information Technology  Economics  Statistics  **Total** | 13  20  16  15  14  10  12  **60** |

**Quantitative data**

|  |  |
| --- | --- |
| **Wages per employee (Shs,000)** | **No. of Employees** |
| 150 to under 200  200 to under 250  250 to under 300  300 to under 350  350 to under 400  400 to under 450  450 to under 500  **Total** | 13  20  16  15  14  10  12  **60** |

**NB:** The groupings in qualitative data is non numeric while that in quantitative data is numeric

**2 Methods of presentation of non numeric distributions**

These distributions are presented using statistical diagrams. These diagrams give a visual display of data in a way that it will display its meaning clearly.

**Types of statistical diagrams**

1. **Bar charts**
2. **Pie charts**
3. **Pictograms**

**2.1 Bar charts**

This is a chart where quantities are shown in form of bars for ease of viewing and drawing conclusions. There are three major types of bar charts

1. ***Simple bar charts***
2. ***Component bar charts and percentage component bars charts***
3. ***Multiple or compound bar charts***

***i. Simple bar chart***

This is a chart consisting of one or more bars in which the length of each of each bar indicates the amount of the corresponding data item (qualitative characteristic of data)

* The chart should have a title
* All bars should have the same width
* Qualitative characteristic of the data should be placed on the horizontal axis and corresponding amounts should be placed on the vertical axis
* Each axis should be labeled clearly and a scale indicated

The **purpose** of the bar charts are to show the actual size of each data item or category and enable one to compare the amount of the data items by comparing the lengths of the bars on the chart.

**Example 1 (class activity)**

LESLEY company sales for the years 2010 to 2015 are as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Sales (millions) | 80 | 120 | 100 | 140 | 160 | 180 |

Present the data on a simple bar chart and interpret the chart.

Simple Bar Chart of LESLEY Company Sales

Sales

Years

**To make observations**

Use the height of the bars to see:-

* If there was an increase or reduction in sales over a period of time
* The year with the highest and lowest sales

**Example 2 (Class activity)**

28 students in a business statistics class reported their options of study as follows

**Option Number of students**

Finance 4

Marketing 5

Management 3

Accounting 10

Hospitality 6

**Total 28**

Construct a bar chart and interpret it.

***ii. Component bar chart***

This is a chart that gives a breakdown of each total into its components. The amounts of components are shown as sections of the bar. One bar chart is divided into sections according to the size / frequency of each component.

**Example 3 (Class activity)**

The following data was got from NYENDO company sales in millions of shillings from 2010 to 2012. Draw a component bar chart and interpret it.

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2010 | 2011 | 2012 |
| Product A | 1,000 | 1,200 | 1,700 |
| Product B | 900 | 1,000 | 1,100 |
| Product C | 500 | 600 | 700 |
| **Total** | **2,400** | **2,800** | **3,400** |

Component Bar Chart for NYENDO Company Sales

Sales (millions)

Years

**Example 4 (Class activity)**

The following sample data on annual expenditure in thousands of shillings of a family was collected from a population in Mpigi town. Draw a component bar chart and interpret it.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Food | Transport | Other | Total |
| 2012 | 4,000 | 3,000 | 4,000 | 11,000 |
| 2013 | 4,500 | 4,000 | 5,000 | 13,000 |
| 2014 | 5,000 | 4,500 | 6,000 | 15,500 |
| 2015 | 8,000 | 8,000 | 7,000 | 23,000 |

**Purpose of component bar charts**

1. To find out how the amount of the total variable under study has changed periodically
2. To show the amount of components of the variable for each period

***Percentage component bar chart***

This is a component bar chart in which the lengths of the sections of a bar relate to the proportions of the components expressed as a percentage. The amount of each component is first expressed as a percentage of the periodic total.

**Example 5 (Class activity)**

Consider the following data on some company sales:-

|  |  |  |  |
| --- | --- | --- | --- |
| **Years** | **2013** | **2014** | **2015** |
| **Components** | **Amount** | **Amount** | **Amount** |
| **A** | 1000 | 1200 | 1700 |
| **B** | 900 | 1000 | 1000 |
| **C** | 500 | 600 | 700 |
| **Total** | **2400** | **2800** | **3400** |

Draw a percentage component bar chart and interpret it.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Years** | 2013 | | 2014 | | 2015 | |
| **Components** | **Amount** | % | **Amount** | % | **Amount** | % |
| **A** | 1000 |  | 1200 |  | 1700 |  |
| **B** | 900 |  | 1000 |  | 1000 |  |
| **C** | 500 |  | 600 |  | 700 |  |
| **Total** | **2400** |  | **2800** |  | **3400** |  |

**Major difference between a component bar chart and a percentage bar chart**

* Total length and section length of each bar in a component chart indicates size. The bigger the amount, the longer the bar
* Total length and section length of each bar in a % component chart indicates a proportion or percentage
* Total lengths of bars in % component chart are the same

***iii. Multiple bar charts***

A multiple bar chart is one in which two or more separate bars are used to present sub-divisions of data.

* It does not show the grand total of each variable like compound bar charts but it uses several separate bars for each total of variable.
* It illustrates comparative amounts of components more clearly than component bar charts

**Example 6 (class activity)**

The following table shows the annual salary in dollars of various grades of NWSC employees in four regions of Uganda

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Job title | North | South | East | West |
| Manager | 17000 | 18000 | 21000 | 23000 |
| Accountant | 15000 | 19000 | 17000 | 17000 |
| Marketer | 14000 | 14000 | 16000 | 14000 |

**Required**

Using a suitable form of bar chart, display the above information graphically and interpret it.

**2.2 Pie Charts**

A pie chart is used to show the relative sizes of components of a given variable in picture form. They are circular and hence sectors are drawn as parts of the total expressed in degrees. So you need a protractor to accurately do the sector drawings. Sector sizes are worked out by converting parts of the total into equivalent degrees of a circle using percentage figures or actual cost figures.

**i. Using percentage figures**

Here you convert from percentage figures to degrees. Hence you convert the data values into percentages and then into degrees to be able to draw a pie chart. The conversion is as follows:-

100% 3600

1% 3.60. You then multiply each percentage by 3.6 to convert to degrees and then draw the pie chart

**ii. Using actual figures**

Here you convert from actual cost figures of the data to degrees. The conversion is as follows:-

3600

1unit 3600/Total

You then multiply each unit by 3600/Total to convert to degrees and then draw the pie chart

**Example**

The costs of production of at factory A and factory B during April 2011 were as follows:

|  |  |  |
| --- | --- | --- |
|  | **Factory A** | **Factory B** |
| **Cost category** | **Millions** | **Millions** |
| Office costs | 10 | 25 |
| Direct labour | 30 | 125 |
| Direct materials | 70 | 50 |
| Over heads | 90 | 50 |
| Totals | 200 | 250 |

**Required:** Show the costs for the factories in pie charts

**Using percentage figures:** Convert each data in factory A and B into percentages and then into degrees by multiplying by 3.60

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cost category** | **Factory A** | | **Factory B** | |
|  | **%** | **Degrees** | **%** | **Degrees** |
| Office costs | 5 | 18 | 10 | 36 |
| Direct labour | 15 | 54 | 50 | 180 |
| Direct materials | 35 | 126 | 20 | 72 |
| Over heads | 45 | 162 | 20 | 72 |
| **Totals** | **100** | **360** | **100** | **360** |

**Using actual figures**

Factory A:Multiply each cost figure by 3600/200 = 1.80 to change to degrees

Factory B:Multiply each cost figure by 3600/250 = 1.440 to change to degrees

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cost category** | **Factory A** | | **Factory B** | |
|  | **Cost** | **Degrees** | **Cost** | **Degrees** |
| Office costs | 10 | 18 | 25 | 36 |
| Direct labour | 30 | 54 | 125 | 180 |
| Direct materials | 70 | 126 | 50 | 72 |
| Over heads | 90 | 162 | 50 | 72 |
| **Totals** | **200** | **360** | **250** | **360** |

**Advantage of pie charts**

Give simple pictorial display of the relative sizes of elements of the total variable

**Disadvantages**

1. They involve calculating degrees of a circle and drawing sectors
2. It is sometimes difficult to compare sector sizes by eye
3. They show only relative sizes

**2.3 Pictograms**

A pictogram is a statistical diagram in which quantities are represented using pictures or symbols. The symbols or pictures should be clear and a key to them is required. Although pictograms present data in a simple and easy to understand way, they lack precision and can convey a limited amount of information.

**PRACTICE QUESTIONS**

1. In 2006 Presidential Elections in Uganda, there were five presidential candidates and the number of votes got by the last three candidates in the constituency of Kayunga district was as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **Constituency** | **Abed Bwanika** | **Obote Miria** | **John Sebaana** |
| **Bbale** | 153 | 109 | 289 |
| **Ntenjeru North** | 195 | 160 | 435 |
| **Ntenjeru South** | 129 | 126 | 306 |

Source: Uganda Electoral Commission

**Required**

Present the performance of each candidate on:

1. Component bar chart
2. Percentage component bar chart
3. Compound bar chart
4. Present your observations

2. Your company is preparing its published accounts and the chairman has requested that the assets of the company be compared for the last five years using the following data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Asset** | **2010** | **2011** | **2012** | **2013** | **2014** |
| **Property** | 69 | 69 | 675 | 80 | 84 |
| **Machinery** | 287 | 287 | 306 | 320 | 300 |
| **Stock** | 510 | 510 | 559 | 627 | 582 |
| **Debtors** | 441 | 424 | 495 | 485 | 583 |
| **Cash** | 17 | 70 | 39 | 85 | 85 |

Required

1. Which type of statistical diagram is more appropriate
2. Construct the above diagram you have chosen
3. Comment upon the movements in the assets over the five year period