Internship report at the Rwanda Revenue Authority

Planning and Research department

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Ezekiel Adebayo in action

Figure 1: Ezekiel in action

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Terms of Reference

As it is in the *AIMS/RRA* terms of references, the AIMS interns will contribute to various analyses done in Planning and Research Department and automate some of the key analyses.

On Job training

On Job training

1. Insight with RRA domain. This included:
   1. Taxation theory
   2. BI and DWH
2. Insight on the various data that were used in the publication of *Tax Statistics in Rwanda*.
3. Attended IMF training on models to estimate Tax expenditure for Rwanda : the training was held at Hotel des Milles Collines, from June 18 to June 22, 2018

Managed and responded to various requests of data

Managed and responded to various requests of data

1. Split sales annex *big data* that were used by IMF team in the exercise of estimating VAT tax expenditure for Rwanda.

Summary of the file

The file was more than 20 million rows, it was difficult to work with that size with local processing software such as Excel, SPSS and Stata. We used **#Rstats** to do data wrangling by tidying the data, split the data on a monthly and quarterly basis so that IMF would carry further work on it.

Managed and responded to various requests of data

2. Contributed to data prepared for MINICOM with regards to the value of transactions made by firms registered in Made in Rwanda policy.

The request was to do analysis based on **TIN**, **Business Income** and **Taxes**.

Managed and responded to various requests of data

3) Quarterly payment of domestic taxes for Manufacturing Vs Non-manufacturing from 2007 to 2018_Q1

Summary of the analysis

Taxpayer's period years were classified according to quarters and tax payment was classified according to manufacturing and non-manufacturing companies using **ISIC** code.

Managing and responding to various requests of data

4) Handling big data for VAT sales annexes

Data wrangling was done for VAT sales annex data 2013-2017 by deleting confidential information. The data were used by the researcher from Harvard University working with IGC on the Consumer Incentives project to evaluate the EBM lottery and potential rebate system.

Structure of the file

The VAT sales annexes data were Big data with more than 30 million rows just for one fiscal year.

Staff development on new programs used in Big Data Analytics

R for data science training class

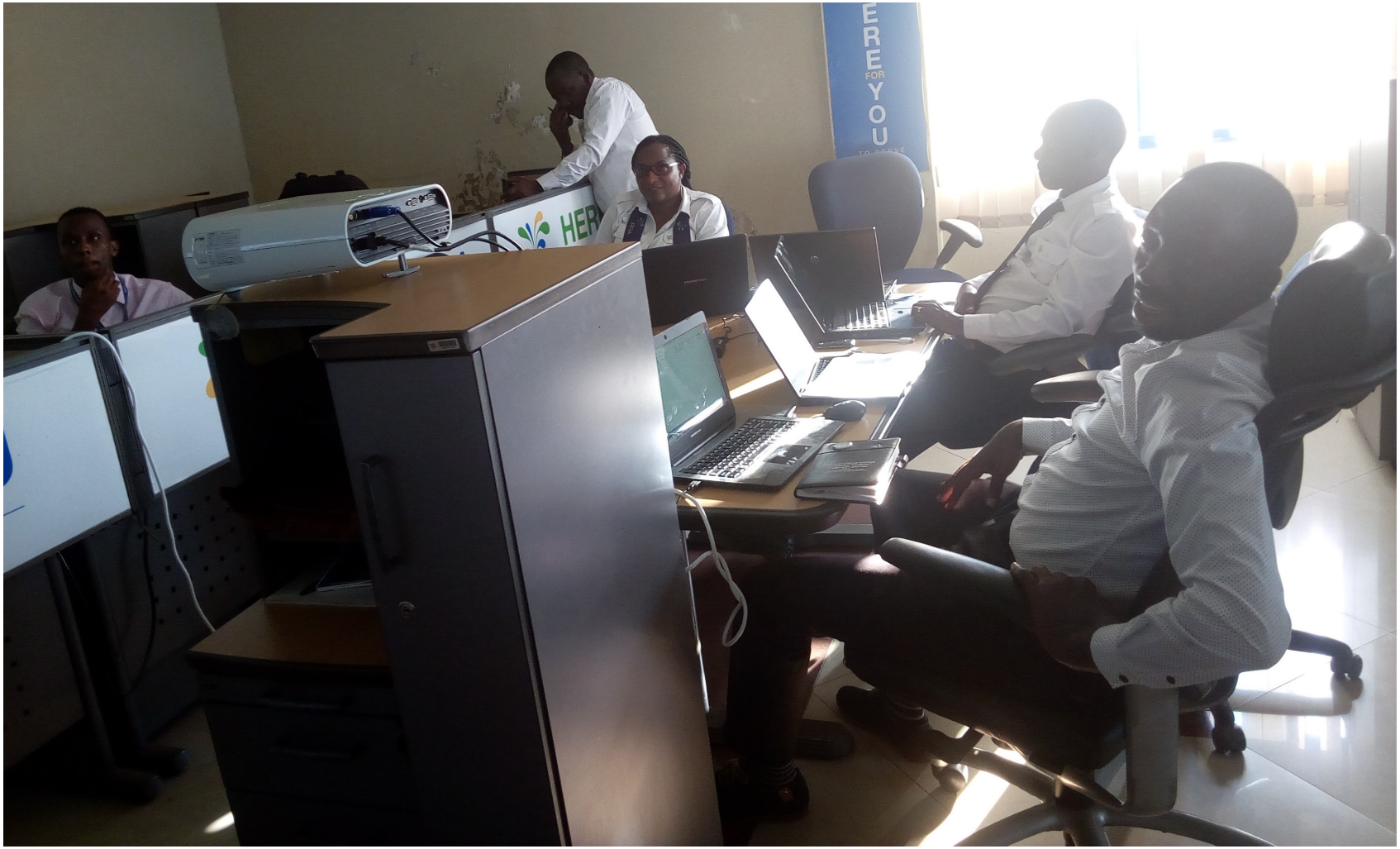

Figure 2: R for data science training

Twelve (12) RRA staff followed the training for ***R for data science*** (R programming language). The training was held in the offices of Planning and Research Department.

The staff came from Planning and Research Department, and Risk Management Department, especially in the following units:

- Statistics Division (P & RD)
- Research Division (P & RD)
- Corporate Planning Division (P & RD)
- BI & DWH unit (P & RD)
- IT_Risk Management (RMD)

Also, 4 interns in Planning and Research Department attended the training.

R codes demonstration

```
data <- tribble(
  ~`Unit(s)`,~  `Number of attendees`,
'Statistics unit', 3,
'Research unit' , 2,
'Planning unit' ,2,
'IT_ Risk management unit', 2,
'BI & DWH unit',    2,
'Interns in R&P, and RMD', 4,
'ODI fellow',1,
'Total',16)
```

Output of R codes

Table 1: List of participants in the R for data science training

	Unit(s)	Number of attendees
1	Statistics unit	3
2	Research unit	2
3	Planning unit	2
4	IT_ Risk management unit	2
5	BI & DWH unit	2
6	Interns in R&P, and RMD	4
7	ODI fellow	1
8	Total	16

What we covered during R session training

R programming language was introduced to the staff for the first time. We covered some syntax that will prepare them for the use of R and make their R programming enjoyable.

- Various atomic data types and structures
- Data import to R and export from R.
- R packages for data wrangling
- Data manipulations and analysis
- Data visualization


Arithmetic Operation
We can perform all the arithmetic operations on matrices
Addition
C <- A + B; C
[,1] [,2] [,3]
[1,] 3 15 27
[2,] 7 19 31
[3,] 11 23 35
Subtraction
D <- B - A; D
[,1] [,2] [,3]
[1,] 1 1 1
[2,] 1 1 1
Developer Circles
YOU
YOU

Automation

Creation of data portal and automation of tax statistics

- Tax revenue by sector
- Tax revenue by enterprise size
- Tax revenue by enterprise type
- Part A: Tax revenue by Enterprise type description
- Part B: Tax revenue by Enterprise type description
- Tax revenue by department

The portal is here

Automation of VAT turnover

- VAT turnover by main sections of the economy
- VAT turnover by main sectors of the economy

Automation of Revenue Performance Analysis

- CIT and PIT
- 3% WHT
- 5% WHT
- 15% WHT

Professional Development at RRA

- Initiative and innovative
- Problem solving
- Power BI
- Advanced R programming
- ggplot2
- SQL
- ddplyr
- Advanced Excel Training
- Networking

Murakoze