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LABORATORY ACCOUNTING AS A TOOL FOR MANAGEMENT

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ABSTRACT

In this write-up, we will show how laboratory-Accounts will help the Scientist in making managerial decisions. When analyzing your Account, we start the analysis by some adjustment to the balance sheet. We shall separate the Assets into Fixed and Current Assets. Fixed Assets are the assets that are more likely to remain in the Laboratory for a long time, for example: "Land and Buildings" will be part of the laboratory possibly forever. Fixed Assets are in general not easy to convert into cash. Current Assets are more easily converted into cash and comprise of things like cash, debt, and closing stock. Liabilities are separated into Current Liabilities and Owner's Equity. The new balance Sheet will show more clearly the reason for the adjustment.

INTRODUCTION

Balance Sheet as at 31st December, 2010

LIABILITIES		ASSETS		
Owner's Equity/Owner's Capital:		Fixed Assets:		
Initial Capital	10,000	Land and Buildings		4,000
Profit	800	Equipment		5,000
Total	10,800	Total Fixed Assets		9,000
Current Liabilities:		Current Assets:		
Closing Valuation		Closing Valuation		
Creditors	2,000	HIV Kits	500	
		Grouping Kits	500	1,800
	2300	Debtors		500
		Cash		1,000
Total Current Assets				3,800
		12,800		12,800

The new balance sheet gives more information at a glance. You can read the four main headings quickly; check the totals, and then concentrate on any section you are interested in. This is especially useful when making comparison with other Laboratories or other businesses.

(a) Your profit: our accounts show that Scientist Okeke made a profit of N800. This amount is a return on both the capital of N10,000 which he introduced into the laboratory and his own labour. It is therefore called Management and investment income.

We know that the Assistants on his laboratory are paid N720 each (Udoji minimum) which ought to be upgraded to N18,000.00 (Goodluck Jonathan's minimum). If we regard N720 as the amount which the Scientist will be able to earn on another laboratory, it will be deducted from the profit figure to get at the net Laboratory Income. In our example the Net Laboratory Income is N800-N720=N80.

"Profit" is the difference between the costs of production and the value of total produce. The profit can therefore be improved by either reducing the costs of production or increasing the level of output. In analyzing your profit this way, we suggest that you include the following points in your consideration.

(i) Intensity of Laboratory Operations System; This depends on how much your laboratory can realize through vast sophisticated and specialized tests carried out and how much you have retainership and get patronage in a given area. In Nigerian laboratories, it is usual to carry out various tests: Grouping and Cross matching, Pregnancy, MP/MF, occult blood, urine analysis, widal, FBS, AFB, culture and sensitivity, Potassium, etc. It is therefore surprising that no account of Grouping and Cross-matching tests, pregnancy, widal tests, etc were shown in Okeke's records. If such tests were done in the laboratory of the Scientist, it must be known as additional income to the laboratory. The value should be deducted from

the amount allowed to the scientist before establishing the Net laboratory Income.

(ii) Yields obtained in individual Enterprise: Any progressive Scientist or Technologist should establish contact with his local representative of the "medical laboratory Science Council of Nigeria" or "Nigerian Institute of Science Technologists", who will give him advice on technical matters like yield which he should be getting on his laboratory and he should equally be contributing to the local association or state chapter as the case may be.

(ii) Prices fixed for tests carried out in laboratories: Most Scientists think about this on their own and know by experience in the market, how well their services sell. The MLSCN and NIST through their local/ state chapters can give you more detailed information on this line to avoid fixing of test prices arbitrarily. You may also learn about prices in many more markets which you will not be able to visit.

We know that our example represented the first year of operation by Scientist Okeke and that things may get better. What we show is that if you keep your accounts and analyze them carefully, you will be in a better position to improve on your results.

(b) **Use of capital**: we are interested in seeing how efficiently the Scientist used the capital of N10,000. From our discussion on "profit" we saw that the Net Lab. income was N80. This is the real measure of the Scientist's performance as a manager. To assess this properly we need to work out the percentage return on the capital, which is

$$\frac{80}{10{,}000} \times 100\% \quad \frac{4}{5}$$

The rate of return is less than one per cent. Since most banks will pay more than 3 per cent. On deposits, the money seems to have been wasted in the laboratory business. It is not unusual for some Scientists with similar returns to regard the profit of N800 as the return on capital which will give then a percentage return of:

$$\frac{800}{10,000} \times 100 = 8\%$$

This will be a mistake and the reasons should be very clear to you by now. Another way of looking at this is to imagine that Okeke employed another person to manage the laboratory for him. He then would have paid the manager a salary of at least N720 and what will be left is the return on his investment. From the balance sheet, you can also get an idea of how well the money is being managed by looking at the ratio of Current assets to current Liabilities. The ratio according to our example is

$$\frac{3,800}{2,000} = 19$$

Therefore the current assets cover the current liabilities very well. If the Scientist is pressed by creditors, he is in a position to raise sufficient cash by disposing some of the Current Assets. (Remember that the Current Assets are those valuable things in the laboratory like building which can easily be sold). This ration should, however be used with care. Where the ratio is excessive it could be that too much money is being tied up in the Lab. or that some of the stock is not selling. In our example that money realized from grouping has been very poor compared with Pregnancy and potassium tests. This could mean that for Okeke, haematology business is a bad "line" but he fare better in Chemical pathology business

(c) Use of Land: we want to know how much an acre of the laboratory space is producing. We first of all work out the Gross Output. The Gross output is what we can regard as the value of the total amount realized from the laboratory activities of the year, after subtracting what we started with. The general formula is: Gross output – total sales – Opening Valuation + Closing Valuation.
In our example it will be

2,700 – 200 + 2,300 = N3,000

The output per acre will be

$$\frac{\text{N3,000}}{100} = \text{N30}$$

This figure will mean more when compared with production during previous year workers were. The usual method is to work out the Gross-output per N100 of labour employed. We have already worked out the Gross output as N3,000. Gross Output/N100 of labour employed

Will be $\frac{\text{N3000}}{2{,}160} \times 100 = \text{N140}$

This may look odd to some people who are not used to financial analysis. They may prefer to show how much each individual produces i.e., Output/man. The problem is that not all people work alike, nor are they paid alike. The Scientists or laboratory managers made different arrangements with their workers. To avoid being involved in these as well as other considerations we direct our attention to ascertaining the net effect of N100 of labour on the laboratory income. Again, it will be a mistake to take the figure of N1,440 as cost of labour employed, unless of course the laboratory owner does not participate in the laboratory work.

B. Depreciation and Valuation

If you study more carefully the final accounts, you will realize that the profit and net worth of the lab. (as shown by the accounts) are influenced to a large degree by the values attached to the Assets. It is therefore important that you acquaint yourself with the methods of arriving at these figures and the principles behind them.

(a)**Depreciation**: Some of the assets which we possess fall in value because of usage. The autoclave we purchased for N4,000 may be worth about N500 after one year because it

is accepted that the autoclave is not as good as a brand new one. This fall in value is what is called "Depreciation".

The reason for making this allowance is that the Scientist will have to replace his equipment at the end of their usefulness. If he estimates that an equipment bought for N4,000 will last four years, he might regard the value as of "depreciation". The records will look like this:

Opening Valuation	4,000
Less Depreciation	1,000
Value at end of 1st year	3,000
Less depreciation	1,000
Value at end of 2nd year	2,000
Less depreciation	1,000
Value at end of 3rd year	1,000
Less depreciation	1,000
Value at end of 4th year	0,000

The depreciation figures will be shown as a cost in the Trading and profit and Loss Account and will therefore reduce the profit. Since the money is not actually spent, it remains in the business and will total N4,000 at the end of the fourth year. The money will then be used to buy a new one.

ALTERNATIVE METHOD

Another method of calculation: the method we recommend is to calculate the depreciation as a percentage of the value of the equipment every year. If we regard 20 per cent as the proper rate of devaluation, the calculation based on our standing example will be as follows:

Autooclave	N
Opening Valuation	4,000
Less depreciation: 20 per cent. Of 4,000	800

Value at the end of First Year	3,200
Less depreciation: 20 percent of 2,560	640
Value at the end of Second year	2,560
Less Depreciation: 20 percent of 2,560	512
Value at the end of Third Year	2,048

In this way, the depreciation is greatest during the first year gradually reducing as the equipment gets older. In general, new equipment reduce in value more rapidly than old ones. For our laboratory accounts, the record of depreciation should be kept as illustrated below.

Depreciation Allowance for Year ended 31st December, 2010

Equipment	Value at 1st January 1974	Add Purchases	Less Sales	Sub Total	Less Depreciation		Value at 31st December, 1974
					Rate	Amount	
	N			N	%	N	N
Autoclave	4,000	--	--	4,000	20	800	3,200
Microscopes/slides	1,000	--	--	1,000	20	200	800
Total N	5,000	--	--	5,000		1,000	4,000

Your notice that if we allow for depreciation as shown by the above records,
The profit of N800 will be wiped out and we finish up with a loss of N200. Our final accounts will be as follows:-

Trading and Profit and Loss Account for the Year, 2010

Opening Valuation	N	Receipts	N
HIV Kits	2,000	HIV tests	2,000
Grouping	--	Grouping x matching	700
Total	2,000	Total	2,700

Allowances for Depreciation		Expenses1,000	Closing Valuation	
Wages		1,440	Grouping	1,800
Incubator		200	HIV	500
Fridge	500	Total		2,300
Interest	60	Loss		200
		2,200		
		5,200		5,200

Balance Sheet as at 31st December, 2010

LIABILITIES	N	ASSETS	N
Owners Equity		Fixed Asset:	
Initial Capital	10,000	Land and Buildings	4,000
Less Loss	200	Equipment	5,000
---- 9,800		Less Depreciation 1,000	4,000
Total Fixed Assets	8000		
Current Liabilities:		Current Assets:	
		CLOSING VALUATION	
		HIV kits	500
Creditors	2,000	Grouping 1,800	2,300
		Debtors	500
		Cash/Bank	1,000
	11,800		11,800

These examples help to illustrate the importance of looking at Accounts with care. You will find that some of the differences between profits made or declared by different laboratories of similar sizes can be explained by the method depreciation. For example if we depreciate at 10% or 5% we would have declared a profit. The account also shows how to treat losses when they occur.

(c) **Valuation**

We are here concerned with the value to be attached to your current assets at the end of the year; "Cash" does not present any problems since the value to the Scientist at the end of the year is certain. Debtors may present some problems if you think that you have done some tests on credit to customers, who are likely to default. In such a case it will be usual to deduct the amount which you think will not be recovered from the value shown in your records and charge the amount to your profit and loss account. If you are not involved in bad debts the "book value" that is, value shown in your ledger Accounts, should be retained on the Balance Sheet. Closing valuation should be treated with care. There are two ways of valuing you stock at the end of the year. You can either value them on the basis of cost of production (at cost) or at market value. If you are selling you laboratory business, your assets will be valued on the basis of what they will fetch in the market. However, when you are only interested in putting a value to your stock which you will retain in the business, it is only prudent to value them at cost. Normally the stock should be able to fetch in the market more than it cost to produce, but putting it at market value is like counting your chicken before they are hatched. There is a problem associated with valuation at cost. When the market is depressed and the price falls below cost of production, it will be silly to value the stock at cost. The stock should never be valued above the amount it can fetch in the market. So the general rule is *value at cost or market value whichever is lower.* In our example the closing valuation is based on cost of production.

(d) **Comparison with other Laboratories**

The analysis of your laboratory accounts provides you with a detailed knowledge of your operations. Equipped with such knowledge, you are in a position to compare your performance with results obtained on other laboratories. You want to know whether your profit rate is below average, whether you are employing more labour than other Scientists, whether the amount you produce per acre or square meter is enough. The ratios we worked out in the analysis section are the ones to use. Because these ratios have been discussed, this section will be brief. In comparing your performance with others it is important that you compare with laboratories of similar type and size, because the decisions which laboratories managers can take on larger laboratories will be different from decision on small laboratories. Take for example, two laboratories (one small, one large) with low output of ₦100 of labour employed. On a small laboratory an increase in the volume of output will usually be the only way of increasing the productivity of labour, since a reduction in the laboratory staff will seldom be possible. But on a larger laboratory, where the volume of output is satisfactory, a low output per ₦100 labour cost may be due to excessive amount of labour and consideration can be given to the possibility of reducing the size of the laboratory staff by better laboratory organization. The fact that an autoclave can be introduced on large laboratories while it will be wasted on small laboratories where sterilizers can be used instead will help to bring out the distinction more clearly.

As a single Scientist, you are not in a position to have records of performances in your state or community. There are three source of such information

i. The ministry of Health in your state.
ii. The Medical and Science laboratory Department of most Polytechnics and Universities in Nigeria, and
iii. The Co-operative Societies and Scientist/ Technologists Associations. These organizations will usually have Laboratory Accounting Units and may help you in many ways to keep your accounts. If you do not get immediate co-operation from the Ministry of

Health in your state, try the Federal Government Survey Unit, Federal Office of Statistics, Lagos. The MLSCN and NIST have been engaged in studies of Laboratory Health survival in Nigeria for many years.

(e) **Introduction to Laboratory Budgeting**

What we have been discussing in part II so far, deals with the laboratory and its existing operation and organization. Laboratory budgeting is concerned with changes in your method of operation, target audience and on your areas of specialization – Chemical pathology, haematology, microbiology, histopathology, etc. If as our example shows, one enterprise (haematology) is not as profitable as another (chemical pathology), the Scientist may want to change his operations by employing another specialist in chemical pathology or decide to form a 'merger" to enable more tests to be done in chemical pathology unit like pregnancy, sodium, potassium, electrophoresis of biological fluids, etc. He might even consider changing the whole organization of his laboratory by moving into new activities like DNA Paternal detection, age detection and practices that will be useful in forensic medicine. In considering such changes, the Scientist will prepare a "budget", which is an estimate of the results from the changes. One is therefore dealing with the future. Nobody can see clearly into the future but it is better to get some idea of what could happen before proceeding with any change in your laboratory practices. In order to prepare a budget, the Scientist will divide all his costs into two groups –"fixed costs" and "variable costs".

Fixed costs, -they are fixed in the sense that they do not depend on the initial capital or the number of tests done. Things like regular labour, machinery costs, rents, insurance, telephone bill must be paid once they have been employed and do not depend on the number of tests done.

The wages must be treated as fixed costs. The interest on the credit obtained when buying the autoclave must be paid for even if it was not used. The depreciation must be allowed for regardless of

the sterilization carried out. These are costs which do not change according to the level of production and are usually incurred for the laboratory as a whole.

Variable costs – These costs vary directly with the number of tests done in the different areas of specialization. They include items like haemoglobin, WBC. FBC. MICROSCOPY – stool and urine, occult blood, Culture and sensitivity, AFB, FBS, etc feeding staff, transport, stores and casual labour. In our example the HIV kits used must depend on the volume of business like number of candidates for Visa. If we used kits worth ₦ 500 on a laboratory of twenty acres, we will probable use ₦ 1,000 worth of kits for forty acres. *The costs vary according to the volume of productivity.* Therefore in our example our costs will be divided into two groups as follows: -

Fixed costs		***Variable costs***		
Wages/light bill:	1,440	Disinfectant	:	200
Interest:	60	Reagents:		500
Depreciation	1,000			

The division between "fixed and variable" costs is very important and is of very practical use. A variable cost item such as disinfectant can be measured out and used in the exact quantities required and if there is any left over, it can be put back into the store. Fixed costs items tend to run on whether they are used or not.

You will see, therefore, that if a change is introduced into the laboratory, the variable costs will change in a way that can be budgeted. The Fixed or the overhead costs on the other hand may hardly change at all-especially if the alteration is small. So when we want to have an idea of what the output of the difference between the change in value of total output and the variable costs. The difference is known as the "Gross Margin", and represents the contribution of the new operation to laboratory income (since the

fixed costs must be paid for any way). We will illustrate this from our example. Supposing our Scientist wants to close down the haematological enterprise and increase the tests done in chemical pathology or microbiology (he has been operating on half of his land i.e. 20 acres). His considerations will be based on two lines of action:

i. Use the remaining 20acres for the Chem. Path/ microbiology business.
ii. Continue to use the 20acres for other more sophisticated haematological practices.

His budget will show whether there will be a gain if the change is made. His first step will be to work out the "Gross Margin".

i. Haematology unit (20 acres)

	N	N
Output		
Output	3,000	2,500
Less variable costs:		
Needles/syringes/disinfectant ..	200	-
Reagents/sterile bottles.. ..	500	700
Gross Margin	1,800	

ii. Lab. Assistant (120)

Output	60	500
Less variable cost:		
Gross Margin	500	

We have no variable cost for the business and the labour looking after them is regarded as fixed cost.

Preparing the Budget

Having dealt with gross margins the Scientist now in a position to prepare his budget. He has two questions to answer. Firstly, is the change likely to increase the laboratory practice profit? Secondly, if the change is worthwhile, how much

capital will be required to carry it out? The two questions should always be considered separately. Our example is very simple but in real situations the problems are very difficult.

a) Profit budget

The form of the budget is as follows: -

Losses	*Gains*
Gross Margin from Enterprise displaced	Gross Margin from the new enterprise
Increase in fixed costs (Balance-increase In profit)	decrease in fixed costs

In our example, we find that the fixed costs may be reduced because of the change. For example, the Scientist finds that his labour requirement is now one, since one man can carry out both the haematological and microbiological tests in the laboratory located in a the 40 acres apartment with the help of automated equipment. The other man who was looking after the premises is no longer needed. The budget will look like this (see page 41).

Losses	N	Gains	N
Gross Margin from haematology(x-match) (3,000) at 60k ..	1,800	500	Gross Margin from MP
Increase in fixed cost .. .. (one regular labour) ..	720	__	Decrease in fixed cost
		500	
Increase in profit		2,020	
		2,520	

It appears that if the blood bank is shut down and the scientist specialized in haematology - MP his profit position will improve in a big way. The above figures are based on the results obtained from the year's trading. The scientist should be able to work out the result if prices were to fall 20k or 30k. This helps to estimates. Even if the price of MP fall by half, the scientist will still be better off making the change. You can work this out for yourself.

b) Capital budget. – a capital budget is designed to show the amount of money that must be spent before the new enterprise is in full production. In our example they were no new investments required –but the method is to list the amount to be spent, say-

	N	
Blood bank	3,500	
Fitting	500	
	_____	-------
	N4,000	4000

The scientist will then work out the rate of return on this capital –2,020*100 =50 percent (approximately), (Remember that the gain in profits was budgeted as N2,020). This is high enough to justify the investment. The scientist can borrow from the bank or any financial institution with confidence that he will repay.

CONCLUSION

This monograph does not deal with management problems in full but we hope that we have been able to demonstrate that any scientist or technologist who wants to be introduced to modern laboratory technique must know or understand laboratory Accounting, Stock control and book-keeping

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