The Budget Software Pro-Forma for Aiding Equipment Procurement Commitees' Decission in Manufacturing and Non-Manufacturing Industry

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Abstract. Equipment Committee is put in place in many industries with memorandum of understanding. Frequently it is difficult to hit the bull. The cause is the lacked knowledge of this service. Hence, development of a software pro-forma using experience and the research data of the experts aids the Equipment Procurement Committee as per their decision making. This was achieved by identification of the required strategic decisions of equipment procurement, ascertaining acceptable mathematical forecasting model fit for this type of budgeting. There were developed: spread sheets for data analysis and storage, the required logic of acting (graphically linking the spread sheets), forecast purchase pro-forma and actual purchased pro-forma, Visual Basic Excel program (Budget Analyzer) that lead to the model application for results generation using a case study. The Forecasted Budget for this case study is N53,740.00; Actual Purchase N46,023,750.00; while Budget Variance is N7,716,670.57. Since this is positive value, this shows an over-budget of 16.77%. This amount needs to be retired by the purchaser otherwise it may lead to embezzlement. This model will find its application in all industries affected by equipment procurement, their activities in both developing and developed countries.

Key words: equipment procurement, pro-forma software, budgeting, equipment committee.

Introduction

The quintessence of any manager's job is planned and control. Budgeting function is given as prominent place in integrated equipment management set up. This is because planning for equipment and working out a realistic budget not only help motivating people but also serve as a control device.

The process of equipment budgeting includes: requirements for equipment, inventory of equipment on hand, inventory norms/targets, forecast of prices and rates, amount of material to be purchased, purchase budget, actual purchase and variance reporting for control.

In viewing the budget process, one quickly notices the necessity for testing the financial effect of numerous alternatives and processing large quantities of data. Computer is especially useful for these two purposes. The computer can perform mathematical calculations in tremendous quantities at fantastic speeds. It can store vast quantities of data.

The first function of management is the development of a series of plans that establish the framework within which future activities will be conducted. Initially, this process involves setting specific objectives and determining operating policies which guide all activities towards the attainment of these objectives. Subsequently, a group of detailed procedure must be developed to implement each policy. Finally, time schedules and financial budgets must be determined to ensure that each group of procedures can in fact be carried out. Preparation of the cash plan (or budget) primarily involves two activities that are combining of all the planned cash inflows and outflows and making

decisions about interim financing, in case of cash shortages, and interim investing, in case of excess cash (Ellis, 2010: 76-158, Lee, 2012: 440).

Forecasting is the best of corporate long-run planning. In the functional areas of finance and accounting, forecasts provide the basis for budgetary planning and cost control (Akinnuli, 2008: 16, Peter, 2007). Production and operations personnel use forecasts to make periodic decisions involving process selection capacity, planning scheduling and inventory (Vitez, 2009). It must be borne in mind that a perfect forecast is usually impossible. There are simply too many factors in the business environment that cannot be predicted with certainty. Therefore, rather than search for the perfect forecast, what is far more important is to establish the practice of continual review of forecasts and to learn to live with inaccurate forecasts (Wuorio, 2009; Peter, 2007, Robinson and Last, 2009).

Budgeting has long been recognized as a basic tool in managerial planning and control. A company budget is a device which balances the planned allocation of expenses with forecasted income during a specified period of time (normally annually and monthly). A typical company budget is composed of numerous sub-budgets, each covering specific departmental operating activities (Ramkumar and Shapiro, 2010). All department heads typically prepare a budget for their area of responsibility and submit it to the controller. In most companies, the controller coordinates the sub-budgets and combines them into a total company budget. The total budget is usually submitted to a budget committee for study and final approval. Most budget committees are composed of top management representatives and the company's major department heads including the purchasing executive or the materials manager (Gardner et al., 1966).

The cash receipts and disbursements approach is usually used for the tactical short-term plan because it provides more details. The financial statement method is usually used for broad analysis of the cash position and for strategic long-range planning (Arrowsmith, 2007; Verma, 2011: 543-687, Vitez, 2009).

The purposes of a budget are to: define the financial objectives and responsibilities of the organization, in terms of objectives for individuals and functions, relative to the overall company objectives; provide a picture of the overall financial state of the company, on a continuous basis; measure the financial performance of the company to reveal problem areas and to increase efficiency of the financial processes used; motivate managers by setting clearly defined financial goals, relative to which they can be measured and help in cost control (Hope et al., 2009: 112-179).

There are several types of budget encountered in a typical organization (Cliche et al., 2012). Types of budget were listed by George et al. (2011: 151-267) as: materials, cash, revenue, expense, headcount, capital, and capital expenditure also supported by Bhimani et al. (2008: 473), Vitez (2009) and Lamoreaux (2011).

Budget requirements to be successfully implemented demand: a well-defined organizational structure, with those within the organization having a clear understanding of their responsibilities; sound accountancy procedures in place to set and monitor budgets within the organization; support from all levels of management within the organization, to implement the budget; good control and feedback procedures with corrective actions in place; willingness to modify the budget as circumstances change. For example, a small overspend on the budget in the year being improved product and vastly increased sales in subsequent years. Clearly the budget should be modified to allow for this increased spend.

Concerning control of budgets Parkinson's Law on Budget states that expenditures will always rise to exceed income. This law could apply to all business operations;

however, it seems especially applicable to institutions. In most institutions, determination to control expenditures is not as strong as it is in industry (Hope et al., 2009: 112-179); Pflaeging (2006), Peter (2007: 76-158).

Performance reports constitute an important of internal management control procedures. These reports serve to motivate managers to perform in conformity with expectations (Ellis, 2010). The discussion of performance report is applicable to both manufacturing and non-manufacturing companies (De Renzio et al., 2005; Ramkumar and Shapiro, 2010).

A realistic profit plan is one of the primary functions of management in manufacturing companies. The profit plan must be complemented with a dynamic system of control (Cliché et al., 2012; Wuorio, 2009).

Planned goals permit the evaluation of performance as the business moves through the planning period. The performance reports should: include all significant aspects of operations; be consistent with assigned responsibilities, and implement the management by exception principle (Bhimani et al. 2008: 473; Robinson and Last, 2009).

Controlling cash flows is a daily task in many companies. Cash performance reports monthly, weekly, and even daily identify evolving cash flow problems that often need immediate attention (Arrowsmith, 2011; Lee, 2012: 440).

Variance analysis is an important tool that can increase the usefulness of periodic performance reports. Rather than taking action only on the basis of a difference between actual and planned or budgeted cost or sales, variance analysis enables management to decompose such differences into smaller sub-variances. Each of these sub-variances relates to a particular type of cause for the overall variance. However, variances, if not corrected, tend to persist and even increase in significance. This tendency can be very costly because variances accumulate over time (Verma, 2011: 543-687).

Methods

The methods used in this research includes: identification of the required strategic decisions required for equipment procurement, ascertaining acceptable forecasting model fit for the type of budgeting, development of spread sheets for data analysis and storage, development of the required logic (graphically linking the spread sheets), development of forecast and actual purchased pro-forma, development of Visual Basic excel program (Budget Analyzer) which lead to the model application for results generation. In company using computerized inventory control system, the work of the inventory control clerk is done automatically by a computer. In such cases, the computer typically produces a purchase requisition (in printed or punch card form) that replaces and contains essentially the same information as the traveling requisition

Forecast Model (Exponential Smoothing)

Exponential smoothing is the most used of all forecasting techniques. It is an integral part of virtually all computerized forecasting programs, and is widely used in ordering inventory in retail forms, wholesale companies and service agencies.

The equation for a single exponential smoothing forecast is simply

$$F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \quad (1)$$

Where: F_t is the exponentially smoothed forecast for period t; F_{t-1} Is the exponentially smoothed forecast made for the prior period; A_{t-1} is the actual demand in the prior period and α is the desired response rate, or smoothing constant (Akinnuli, 2008; George et al., 2011).

Sheet Analysis and Data Storage Development

Excel was used to basically to store the data belonging to each sub-menu of the Budget. The sub-menus are “Spare parts”, “Equipment”, “Accessories”, “Miscellaneous” and the “Total”. Aside the storing of data, excel is ideal for the recalculation of values in the formula expressions. Thirdly, excel is best for spreadsheet analysis has to do with linking of different sheets for a particular function. To the design, each excel sheet was named according to the sub-menu, for instance, the data for Spare parts is stored in Sparepart.xls.

The prototype of the sheet (which is same for all) has 17 columns.

1st Column → Cost (the name of the machine or expense)

2nd Column → Year1 (the value of the machine in the first year)

3rd Column → Year2 (the value of the machine in the second year)

4th Column → Year3 (the value of the machine in the third year)

5th Column → Year4 (the value of the machine in the fourth year)

6th Column → Year5 (the value of the machine in the fifth year)

7th Column → (Yn/n) (the Average of Year1 to Year5)

8th Column → α = 0.2 (Constant)

9th Column → 1 – α = 0.8 (Constant)

10th Column → αYr5 (the calculation of the value of α * Year 5.)

11th Column → α (1 – α) Yr4 (the calculation of the value of α * (1 – α)* Year 4

12th Column →α $(1 – α)^2$ Yr3(the calculation of the value of α * (1 – α)^2* Year 3)

13th Column → α $(1 – α)^3$ Yr2(the calculation of the value of α * (1 – α)^3* Year2

14th Column → α $(1 – α)^4$ Yr1(the calculation of the value of α * (1 – α)^4* Year 1)

15th Column → α (1 – α) ∑ (the calculation of the value of (1 – α)* ∑ (Yn/n)

16th Column → G = FV (the calculation of the value of columns 10, columns11, columns 12, columns 13 and column 14 and column 15) which is totaled to give the total forecast.

17th Column → Actual Price (the calculation of the value of Year 5 and α*Year 5) which is totaled at the end of the column to give the total purchase value for the sheet.

Graphical Sheets Linkage

The sheets are being linked in the graphical form shown below

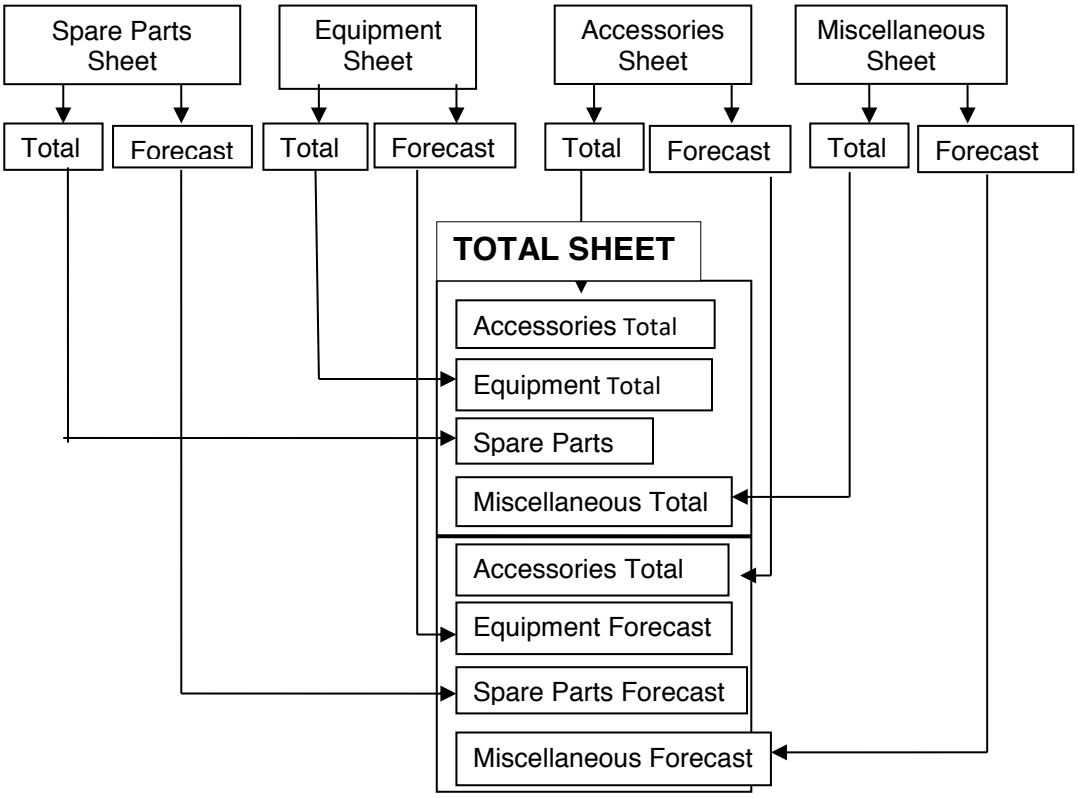

Fig. 1: Logic for the Graph Sheet Linkage.

Each of the submenu sheets are being linked to the total sheet which has about 17 rows.

Totaling of Sheet

The rows are subdivided into 3 main parts Actual Purchased, Total, Budget Forecasted and Budget Variance.

Actual Purchased

The actual purchased has four total:

1. Spare Parts Purchased (Sp): the total of the Actual Price column in spare parts sheet.
2. Equipment Purchased (Ep): the total of the Actual Price in the equipment sheet).
3. Miscellaneous on Purchase (Mp): the total of the Actual Price on the miscellaneous sheet).
4. Accessories Purchased (Accp): the total of the Actual Price in the accessories sheet).

Hence, Actual Purchased Value (Ap = Ep + Sp + Mp + Accp) is the total of the Actual Price in the spare parts sheet, Equipment Sheet, Accessories Sheet and Miscellaneous Sheet.

Budget Forecasted Pro-Forma Development

The budget forecasted has four-row totals which are:

1. Equipment Forecasted (Ef): the total of the Forecast column in equipment sheet.
2. Spare Parts Forecasted (Sf): this is the total of the Forecast in the spare parts sheet.
3. Accessories Forecasted (Af): this is the total of the Forecast in the accessories sheet.
4. Miscellaneous on Forecast (Mf): the total of the Forecast on the miscellaneous sheet.

Hence, Budget Forecasted, Bf is the total of Spare Parts Forecasted, Equipment Forecasted, Accessories Forecasted and Miscellaneous on Forecast.

Budget Variance (Bv = Bf–Ap)

This has about three-row totals and a row for conclusion. The Budget Forecasted, the Actual Purchased and the Budget Variance.

The Budget variance is equal to Budget Forecasted – Actual Purchased.

Budget variance conclusion which is gotten by a code, is given below:

Conclusion (= if (B19>0, “OVERBUDGETING”, if (B19 = 0, “IDEAL BUDGETING”, if (B19 < 0, “UNDERBUDGETING”).

Programming Excel with VB (Visual Basic Language)

The program is called Budget Analyzer. It has two main forms:

1) frmmain which is captioned Budget Analyzer;
2) frmmenu which is captioned Menu.

Budget Analyzer (Frmmain)

This is the welcome menu with a label and two command buttons. The label talks about the program and at run time prints the statement.

“THIS PROGRAM DOES THE BUDGET ANALYSIS OF MACHINERIES TO BE PURCHASED AND FORECASTS THEIR VALUE”

The first command button is named ‘cmdlogon” and with the Caption “LOG ON”. It takes us into the menu form. It has the code:

```
Private Sub cmdlogon_Click ()
Frmmenu show
End Sub
```

The second command button with Caption Exit ends the program at run time. It has the code:

```
Private Sub Command2_Click ()
End
End Sub
```

Menu (FrmMenu)

This has about seven objects.

1. Frame: which has the caption “Select a Sheet”.
   It groups the other 6 objects together, which includes a command button and 5 OLE MS Excel objects each linking to their respective files in their stored location.
2. Spare Parts OLE Icon.
   This is an Ole icon when clicked links to the spareparts.xls which is located in the A drive.
3. Equipment OLE Icon.
   This is an Ole icon when clicked links to the equipment.xls which is located in the A drive.
4. Accessories OLE Icon.
   This is an Ole icon when clicked links to the Accessories.xls which is located in the A drive.
5. Miscellaneous OLE Icon.
   This is an Ole icon when clicked links to the Miscellaneous.xls which is located in the A drive.
6. Total Sheet OLE Icon.
   This is an Ole icon when clicked links to the Total Sheet.xls which is located in the A drive.
7. Close Command Button.
   This is a command button with caption close. This unloads the form. It has the code:

```
Private Sub Command2_Click()
Unload Me
End Sub
```

8. At run time the main form will show and the LOG ON button takes us to the menu form which we can select any sheet by clicking. On clicking the MS Excel application is opened and the particular file is opened. The sheets are afore linked to the Total Sheet. Any update on sheet tells on the Total Sheet and the total Sheet recalculates itself.

Results

Developed Model Application results are represented in the tables below. Equipment Sheet (Machines Sheets) results are shown in the Table 1.

Table 1. Equipment Sheet (Machines Sheets) Results

Cost	Yr1 x1000	Yr2 x1000	Yr3 x1000	Yr4 x1000	Yr5 x1000	G=FV	Actual Price
Extruder 60	3,000	3,100	3,200	3,300	3,500	4,776,800.00	4,200,000.00
Extruder 65	3,600	3,7500	3,800	3,900	4,120	5,680,512.00	4,944,000.00
Extruder 30	4,400	4,650	4,850	4,950	5,100	7,101,408.00	6,120,000.00
Extruder 90	5,300	5,430	5,670	5,820	5,960	8,347,968.00	7,152,000.00
Colling Machine	1,800	1,920	2,180	2,220	2,360	3,127,104.00	2,832,000.00
Stranding Machine	6,500	6,680	6,800	6,920	7,140	10,068,512.00	8,568,000.00
Drawing Machine	2,800	2,930	3,170	3,300	3,450	4,657,168.00	4,140,000.00
						43,759,472.00	37,956,000.00

Accessories Sheet results are systemized in the Table 2.

Table 2. Acessories Sheet Results

Equipment	Yr1 x1000	Yr2 x1000	Yr3 x1000	Yr4 x1000	Yr5 x1000	G=FV	Actual Price
Accumulator	10	12	13,5	14,3	15	19,504.00	18,240.00
Cooling Tough	20	21,7	23	24,4	26	34,324.48	31,200.00
Air Pressure	1,000	1,100	1,160	1,190	1,230	1,688,240.00	1,476,000.00
Solendon Coil	20	22	23,4	25	26,5	34,890.40	31,800.00
Solendon Valve	50	51,7	53	54,4	56	78,494.08	67,200.00
Take Up	100	112	120	122	130	173,980.80	156,000.00
Manker	2	2,8	3,2	3,52	3,73	4,609.36	4,476.00
Dry Air Trough	10	12	14,2	15,7	17	20,801.60	20,400.00
Spark Testing Machine	1	1,200	1,320	1,400	1,570	1,950,160.00	1,884,000.00
Mixer Feed	200	212	217,5	229	234	324,172.80	280,800.00
Counter	5	5,85	6,7	8	9,4	10,618.24	11,280.00
Pointing Machine	50	52,5	54	55,7	57	79,768.00	68,400.00

						4,419,563.76	**4,049,796.00**

Miscellaneous Sheet results are represented in the Table 3.

Table 3. Miscellaneous Sheet Results

Cost	**Yr1 x1000**	**Yr2 x1000**	**Yr3 x1000**	**Yr4 x1000**	**Yr5 x1000**	**G=FV**	**Actual Price**
Freight	950	1,000	1,230	1,360	1,400	1,785,664.00	1,680,000.00
Tax	6,000	730	750	810	970	2,467,472.00	1,164,000.00
Insurance	500	540	580	610	630	851,696.00	756,000.00
Installation	80	85	91	94	98	133,225.60	117,600.00
Maintenance	65	72	80	83	88	115,897.60	105,600.00
Training	30	42	47,5	49,3	54	67,174.40	64,800.00
Safety	23	27	28,5	30	32,5	42,156.96	39,000.00
Miscellaneous	46	48	50	52,5	58	75,803.52	69,600.00
						5,539,090.08	**3,996,600.00**

Spare Parts results are represented in Table 4.

Spare Parts Sheet is systemized in Table 4.

Table 4. Spare Parts Sheet

Cost	**Yr1 x1000**	**Yr2 x1000**	**Yr3 x1000**	**Yr4 x1000**	**Yr5 x1000**	**G = FV**	**Actual Price**
Gear 22308	1	1,2	1,340.00	1,530.00	1,64	2,022.72	1,968.00
Gear 22211C	1,08	1,17	1,30	1,47	1,56	1,974.68	1,872.00
Gear 22311	1,25	1,4	1,58	1,70	1,82	2,324.00	2,184.00
Gear 22309	1,1	1,265	1,37	1,52	1,73	2,101.81	2,076.00
Gear 22207C	1,35	1,420	1,6	1,73	1,85	2,379.60	2,220.00
Oil Seal 85 X 110 X 12	0,5	0,545	0,585	0,63	0,685	880.65	822.00
Oil Seal 55 X 72 X 10	0,62	0,685	0,730	0,775	0,840	1,090.37	1,008.00
Extruder Motor Belt	0,6	0,645	0,700	0,75	0,820	1,051.20	984.00
V Belt B-100(2585)	0,645	0,68	0,745	0,80	0,855	1,112.83	1,026.00
V Belt A -90	0,63	0,67	0,730	0,81	0,90	1,121.66	1,080.00
V - Belt A – 30	0,59	0,665	0,740	0,805	0,875	1,102.95	1,050.00
Capstan SN – 612	0,585	0,645	0,700	0,765	0,83	1,055.97	996.00
Capstan SN – 607	0,56	0,625	0,690	0,750	0,87	1,051.40	1,044.00

Fan Belt	0,5	0,565	0,635	0,700	0,82	971.30	984.00
Solendon Valve	1	1,2	1,35	1,55	1,70	2,053.60	2,040.00
						22,2943	**21,3540**

Total Sheet is systemized in Table 5.

Table 5. Total Sheet results.

Actual Purchased:	
Equipment Purchased, Ep .	37,956,000.00
Spare Parts Purchased, Sp.	21,354.00
Accessories Purchased, Ap.	4,049,796.00
Miscellaneous On Purchase, Mp.	3,996,600.00
Actual Purchased : (Ap) = Ep + Sp + Mp +Ap =	46,023,750.00
Budget Forecasted (Bf)	
Equipment Forecasted, Ef =	43,759,472.00
Spare Parts Forecasted, Sf =	22,294.73
Accessories Forecasted, Af =	4,419,563.76
Miseсllaneous On Forcast	5,539,090.08
Budget Forcasted (Bf)	53,740,420.57
Budget Variance: (Bv=Bf – Ap)	
Budget Forcasted (Bf)	53,740,420.57
Actual Purchased (Ap)	46,023,750.00
Budget Variance (BV).	7,716,670.57
DICISION :	**OVER BUDGETING**

Conclusion

Computer applications oriented software for forecasting equipment cost, accommodating the actual costs and determine its variance has been developed, tested and gave a good result, within a very short period. Base on this case study there is an over budget of seven million seven hundred and sixteen thousand six hundred and seventy naira fifty-seven kobo to be refunded by the officer in charge of procurement. (N7,716,670.57). The excess must be retired immediately failure of which can expose purchaser to embezzlement. The aim of this research of which is to develop a software pro-forma for equipment procurement has been achieved. Developing premises about the environment, making decisions on courses of action, initiating actions that translate plans into results and currently re-planning to correct observed deficiencies has been achieved. This software is recommended for use in low, medium and large scale industries and establishments that uses equipment for their equipment budget and control.

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