

USING TIME SERIES CHARTS TO ANALYZE FINANCIAL DATA (Presented at 2002 Annual Quality Conference)

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SUMMARY

This paper demonstrates the approach that one company has used to involve senior and mid-level managers in using time series charts to monitor financial results. Using a team-based approach, the key components required to blend the traditional monthly financial reports with a time series analysis were defined. It was a given that any financial monitoring system still had to include the basics from the financial reports. This includes, at a minimum:

- Last month's result and how it compared to budget.
- Year-to-date result and how it compared to budget and last year-to-date.

The time series approach greatly expands the ability of leadership to use and interpret financial data and to make decisions based on this interpretation. The time series approach includes the ability:

- To see a video of the process over time instead of the snapshot in time presented in the traditional financial reports.
- To determine if short or long term trends are present.
- To find potential problems quickly.
- To get a signal when something has changed dramatically.
- To forecast next month's result.
- To forecast the impact of a short-term trend if it continues.
- To forecast the year-end result.

The team developed the process for bringing these two methods of analyzing financial results together. Combining the traditional financial reporting with a time series approach has resulted in a more in-depth appreciation of time series charts and the information contained in the charts. Managers review the monthly results for over 50 financial variables using this approach. This has given them early warnings of problems plus much better data for planning and budgeting. It has also resulted in significant time-savings for managers in the analysis of the financial performance of the organization.

INTRODUCTION

Eli Goldratt, the Theory of Constraints creator, defines the goal of any for-profit company as "to make money in the present as well as the future."¹ Managers use various financial reports to determine if their companies are meeting this goal. These reports often show you how the company has performed for the current time period (usually a month or quarter) and year-to-date and how the performance compares to budget and to last year.

Dr. Donald Wheeler has written extensively about the man-made chaos that comes from managers relying on these financial reports to make decisions.² Dr. Wheeler contends (and correctly so) that managers should use time series (control) charts to manage their processes.³ All processes, including financial ones, generate data. What you need is a method to take the data and turn it into information. That method, the time series chart, has been around for many years. Why has management as a whole ignored the use of this tool and what can be done to change this?

BACKGROUND

Mayer Electric Company, Inc. is an electrical distributor with headquarters in Birmingham, Alabama. There are 40 branches throughout the southeast United States. Each branch has a branch manager who is expected to make and keep the branch profitable. In 1991, Mayer Electric implemented a Continuous Quality Improvement (CQI) process. CQI has contributed to the success of the company over the years. The CQI process is a blend of people skills (teamwork, motivation, recognition and social styles) and process skills (problems solving tools). Everyone in the company has been introduced to the CQI process in a two-day Quality Awareness seminar taught internally. In addition, over 10% of the associates completed two weeks of in-depth training in CQI.

Measurement is a major component of CQI. The use of statistical process control (SPC) is common through the company, a rare event for a distributor. Each branch location maintains and uses over fifteen control charts required by headquarters. These include cycle counting, inventory availability, on-time delivery, and first pass yield on payables. Most branch managers keep additional charts to help with local issues.

All branch managers, as well as senior leadership, understand the concept of common and special causes of variation. Of course, there is variation in how they apply that understanding. But as a whole, leadership had not used their knowledge of variation in examining the financial numbers they use to run the business.

Leadership used their financial reports to judge if they were meeting the goal of making money. The financial reports include an income statement and balance sheet. To their credit, leadership had designed their statements to allow them to look at an 18 – 24 history for each variable (such as sales and gross profit dollars) in a table format.

An example of the report for one variable (sales) is shown in Table 1. Leaders use this information to determine if they are meeting the budget, how far away from the budget they are and how they compare to last year. Leaders also use the numbers to see if sales are increasing or decreasing and how sales for the month compare to the previous year.

Table 1 shows that year-to-date sales through June 2001 for the year were \$5,710,777. The budget is \$6,000,000 (\$1,000,000 per month). So the variance is -\$289,223. The branch is not meeting its sales budget. The branch is also behind last year-to-date sales (\$5,736,695). The numbers indicate that the sales are not increasing over time, but they don't seem to be decreasing either. What do you see in the table of numbers? The financial report contains over 50 variables.

MANAGEMENT AND CONTROL CHARTS

In most companies over the years, management has not learned to use and appreciate control charts for their own processes. Obviously, many managers believe in the power of control charts for the worker on the floor. Many companies use control charts to control and monitor their key processes. Many managers also understand the concept of process capability. But when it comes to their own processes, managers tend not to think about common or special causes. It is as if they don't make the connection that the processes they manage are no different than the processes on the floor.

Table 1: Financial Report (000)

YTD-01:	SALES
ACTUAL	\$5,710,777
BUDGET	\$6,000,000
VAR	(\$289,223)
YTD-00:	\$5,736,695
Jun-01	\$965,345
May-01	\$819,007
Apr-01	\$961,690
Mar-01	\$840,273
Feb-01	\$1,001,558
Jan-01	\$1,122,905
Dec-00	\$689,679
Nov-00	\$648,125
Oct-00	\$1,111,742
Sep-00	\$827,840
Aug-00	\$721,466
Jul-00	\$813,271
Jun-00	\$1,148,533
May-00	\$1,205,467
Apr-00	\$1,000,470
Mar-00	\$669,352
Feb-00	\$913,199
Jan-00	\$799,674

There are a variety of reasons that managers continue to use the financial reports instead of control charts. These include:

1. They are comfortable with the financial reports. This is how managers have learned to run the business. It is easy to look at the report and compare two numbers. The comparisons include:
 - This month's result to last year's result.
 - This month's result to budget.
 - Year-to-date result with last year-to-date.
 - Year-to-date result to budget.

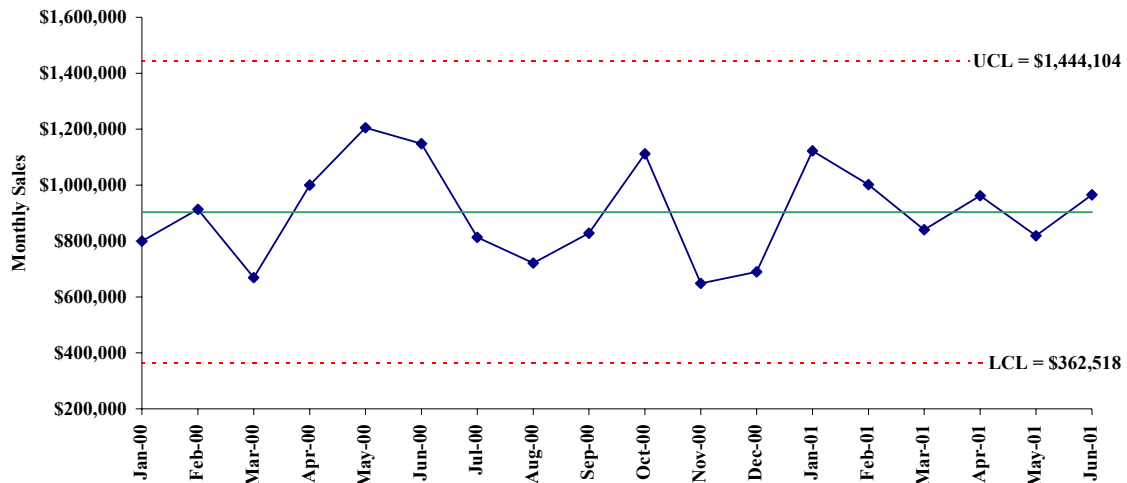
This type of comparison makes it easy to make decisions, although sometimes incorrect decisions as pointed out by Dr. Wheeler.

2. Managers are not comfortable with the concept of variation for financial processes, even those who have been trained in variation. Yes, they may remember the red beads from Dr. Deming, but they still believe a 5% change in any financial number (such as sales) is significant and there must be one or two reasons why it changed that much.
3. Even if a manager understands variation, he/she believes it takes too long for a control chart to signal there is a problem. The classic reason for a chart being out of control (besides points beyond the limits) is when you have a run of seven points above or below the average. A manager does not want to wait for seven months before taking action. The zone tests let you find out of control situations somewhat faster (two to five months). Obviously, so a manager says, if a month's result is beyond a control limit, there is a special cause. But, according to the manager, he/she would have known that anyway.
4. Managers believe that the control limits are too wide to use for any decision-making. Figure 1 is a typical example of an X (individuals) control chart, without the moving range chart, monitoring monthly sales (based on the data in Table 1). This location averages about \$900,000 in sales per month. The process is in control, which means that sales can vary from a low of \$362,518 (LCL = lower control limit) to a high of \$1,444,104 (UCL = upper control limit).

Telling a manager that his sales process is in control and that next month (and in coming months) he can expect sales between 362 thousand and 1.44 million dollar does him little good. He knows that. In fact, he will usually give you a much narrower range of values of what he expects sales to be in the next month and be right most of the time. The control limits in this example are over a million dollars apart. What the manager wants to know is how he is doing versus budget and compared to last year. After all, this is usually what he is graded on.

5. Managers do not believe that you can forecast future results based on the past. They believe you must take into account future planned activities effects on the financials results.

Figure 1: Monthly Sales Through June 2001



So, if you want to involve managers in using control charts, you must meet their needs and address the issues they have with using control charts. What you also want to do is to demonstrate the additional insights that the manager can gain by analyzing the results as a control chart.

DEFINING THE TIME SERIES APPROACH

A major reason that managers don't use control charts to monitor financial data is that, by themselves, the control charts do not provide all the information they need. They need the information on how they are performing versus budget and last year. But they also need the information contained in the time series chart, even if they don't know it at first.

A team was formed to define what senior leadership and branch managers needed on a monthly basis to manage the business. The team included branch managers and associates who were experts in variation and control charts. It was a given that any financial monitoring system still had to include the basics from the financial reports. This includes, at a minimum:

- Last month's result and how it compared to budget.
- Year-to-date result and how it compared to budget and last year-to-date.

The team also defined how the time series approach could greatly expand the ability of leadership to use and interpret financial data and to make decisions based on this interpretation. This includes the ability:

- To see a picture of the process over time instead of the snapshot in time presented in the traditional financial reports.
- To determine if short or long term trends are present.
- To find potential problems quickly.
- To get a signal when something has changed dramatically.
- To forecast next month's result.
- To forecast the impact of a short-term trend if it continues.
- To forecast the year-end result.

The team had to determine how to handle two major components of the analysis: trends and forecasting. The analysis of time series charts is different depending on whether there is a trend. In addition, forecasting is not an exact science. Both these issues are discussed below.

TRENDS

With financial data, the best type of control chart to use is an X (individuals) chart. Our experience has shown that there is little reason to use a moving range chart with the X chart. The moving range chart seldom adds any value to the analysis of the data. It only adds confusion for the most part. The average moving range is used to determine the control limits.

If there is no trend in the data, the control limits are the calculated using the following formulas:

$$\bar{X} = \frac{\sum X}{k} \quad UCL = \bar{X} + 2.66\bar{R} \quad LCL = \bar{X} - 2.66\bar{R} \quad \bar{R} = \frac{\sum R}{k-1}$$

where \bar{X} is the average for the variable and \bar{R} is the average of the moving ranges between consecutive months. Figure 1 is an X chart for sales based on the data in Table 1. There is no trend in this data.

Figure 1 is in statistical control. For a manager, what does this mean? It means that the process (sales in this case) is consistent and predictable. The manager can predict what will happen in the future. In this case, the manager can predict that sales will be between .362 and 1.44 million dollars. As stated before, this really does the manager very little good. The real value of the time series approach is providing feedback to the manager on efforts to improve sales. In this case, the news is not good if there have been any efforts to improve sales. Any efforts to improve sales have not impacted the system. And, as long as they continue to do the same thing, they will continue to get the same results. To improve sales, they must fundamentally change their sales process. *So, for the manager, it is not the control limits that are important. It is the story the video is telling you about your process that is key.*

One key to the time-series approach is the ability to identify short-term or long-term trends. In this case, a long-term trend covers the time period of the analysis. This is always at least 12 months. A short-term trend is six months.

If there is a trend, it is described by the equation:

$$X = b_0 + b_1T$$

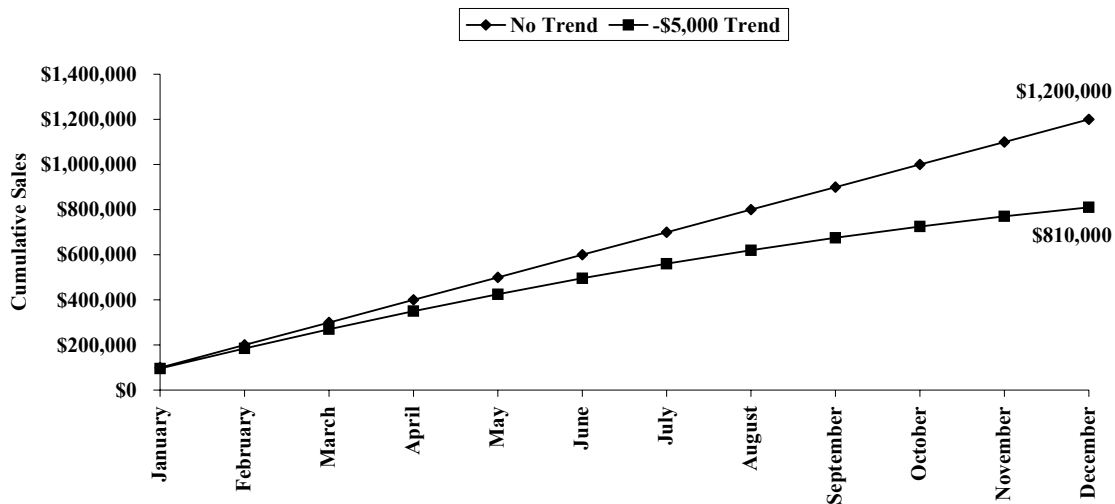
where X = the variable (such a sales), T = the month number (month number 1, 2, etc.), b_1 = the slope of the line (the estimated change in the variable each month), b_0 = the y intercept (where the line intersects the y axis).

The value of b_1 is very important in the analysis of the results. Suppose we have a process that generates \$100,000 in sales per month. Suddenly, that process begins to trend down at rate of $b_1 = \$5,000$ during January. What is the impact on the year-to-date sales at the end of December? How much would we lose? Many quickly answer 12 months x \$5,000 = \$60,000, but this is incorrect. A trend is cumulative, as shown in Table 2. The actual impact is lost sales totaling \$390,000! The cumulative sales are shown graphically in Figure 2.

Table 2: Impact of Downward Trend of \$1,000 per Month

Month	Sales with No Trend	Cumulative Sales with No Trend	Sales with Trend	Cumulative Sales with Trend	Variance
January	\$100,000	\$100,000	\$95,000	\$95,000	\$5,000
February	\$100,000	\$200,000	\$90,000	\$185,000	\$15,000
March	\$100,000	\$300,000	\$85,000	\$270,000	\$30,000
April	\$100,000	\$400,000	\$80,000	\$350,000	\$50,000
May	\$100,000	\$500,000	\$75,000	\$425,000	\$75,000
June	\$100,000	\$600,000	\$70,000	\$495,000	\$105,000
July	\$100,000	\$700,000	\$65,000	\$560,000	\$140,000
August	\$100,000	\$800,000	\$60,000	\$620,000	\$180,000
September	\$100,000	\$900,000	\$55,000	\$675,000	\$225,000
October	\$100,000	\$1,000,000	\$50,000	\$725,000	\$275,000
November	\$100,000	\$1,100,000	\$45,000	\$770,000	\$330,000
December	\$100,000	\$1,200,000	\$40,000	\$810,000	\$390,000

Figure 2: Comparison of Cumulative Sales for Process with No Trend and With Trend



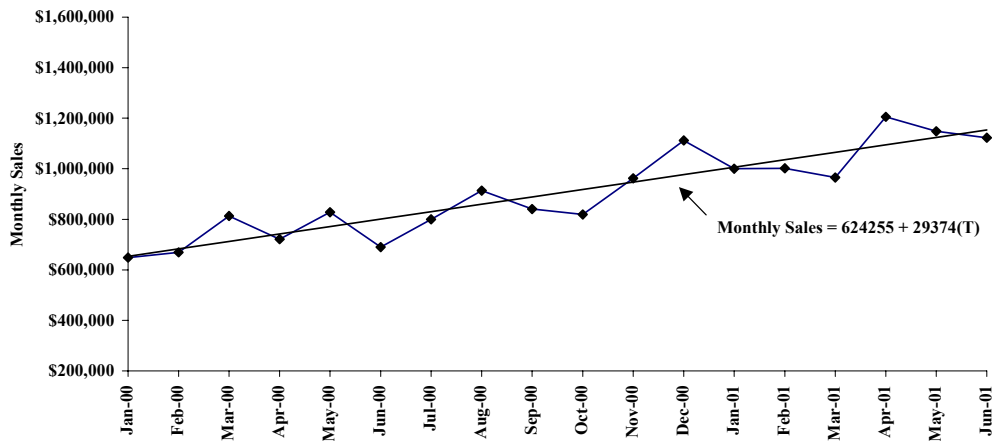
As a rule of thumb, you can multiply the change for one month by 78 to estimate the impact of a constant downward trend over 12 months.

The data in Table 3 is the same data as in Table 1 but rearranged to give a trend. Statistical analysis of the data in Table 3 shows that there is a significant upward trend. The best-fit line for this trend is given by:

$$X = b_0 + b_1T = 624255 + 29374(T)$$

where X is the monthly sales and T is the month number. This means that sales are increasing an average of \$29,374 per month. The chart of the data with the trend line added is shown in Figure 3.

Figure 3: Sales Data Chart with Trend



**Table 3
Sales Data With
Trend**

Jan-00	\$648,125
Feb-00	\$669,352
Mar-00	\$813,271
Apr-00	\$721,466
May-00	\$827,840
Jun-00	\$689,679
Jul-00	\$799,674
Aug-00	\$913,199
Sep-00	\$840,273
Oct-00	\$819,007
Nov-00	\$961,690
Dec-00	\$1,111,742
Jan-01	\$1,000,470
Feb-01	\$1,001,558
Mar-01	\$965,345
Apr-01	\$1,205,467
May-01	\$1,148,533
Jun-01	\$1,122,905

The existence of a trend changes how you look at the average and control limits. The average, if there is no trend, is simply the arithmetic average of the data. The average for the data is \$903,311, which is the same as the average for the data in Table 1. When looking at Figure 3, this average is much less than the trend line indicates for June 2001. Thus, the trend should be accounted for in determining the “average” over time. To determine the average for the month of June 2001, the equation for the best-fit line is used. T is the month number. June 2001 is the 18th month in the data, so the average value for sales in June 2001 based on the best-fit equation is:

$$X = b_0 + b_1T = 624255 + 29374(T) = 624255 + 29374(18) = \$1,152,987$$

The control chart needs to account for this trend. If not, the control chart will look like it is out of control. This may not be the case. It is possible that sales are trending up at a rate that is consistent and predictable (in control). To find this out, a control chart must be constructed.

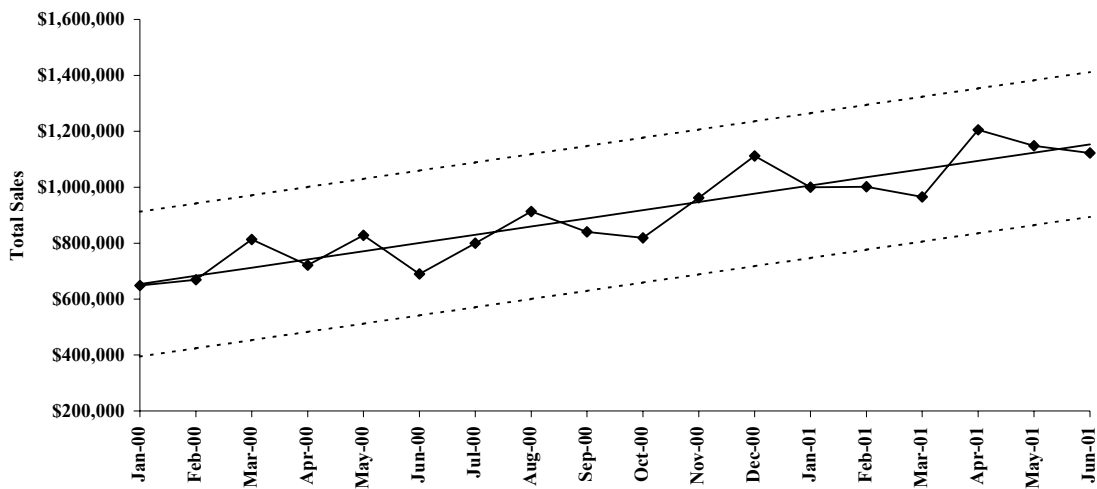
The upper and lower control limits are calculated using the following:⁴

$$\bar{X} = b_0 + b_1T \quad UCL = b_0 + b_1T + 2.66\bar{R} \quad LCL = b_0 + b_1T - 2.66\bar{R} \quad \bar{R} = \frac{\sum R}{k-1}$$

The control limits parallel the average. Performing the calculations for June 2001, the LCL = \$894,048 and the UCL = \$1,411,937. Figure 4 shows the sales data with the control limits added. A trend control chart is interpreted the same way as a normal control chart. The average for a trend chart is simply the best-fit equation. The data in Figure 4 is in statistical control. *For the manager, this means that sales are increasing at a consistent and predictable rate. As long as everything stays the same, this trend will continue. In this case, the manager’s process is increasing sales. Again, it is the story the video tells that is important.*

A manager can use a chart like Figure 4 to see when new staff needs to be added. If sales continue upward, sooner or later additional support (inside sales and warehouse) will be needed. This type of analysis gives the manager information he can use to make that judgment.

Figure 4: Monthly Sales Trend Control Chart



Two types of trends should be considered. One is a long-term trend. This covers the time period from the analysis (January 2000 – June 2001 in Figure 4). The other is a short-term trend that we defined as six months (January 2001 – June 2001 in Figure 4). Table 4 will help you determine how to interpret the trends.

Table 4: Analysis of Trends

Long-Term Trend?	Short-Term Trend?	Conclusion
No	No	There are no trends.
Yes	No	There is a long-term trend, but it appears to have gone away over the short-term (last six months).
No	Yes	A short-term trend has developed and, if it continues, will impact the long-term results.
Yes	Yes	A definite trend is present.

In Figure 4, statistically there is a long-term trend, but no short-term trend. This means that there appears to have been an upward trend from January 2000 through June 2001, but the trend may have gone away since there is no trend over the last six months.

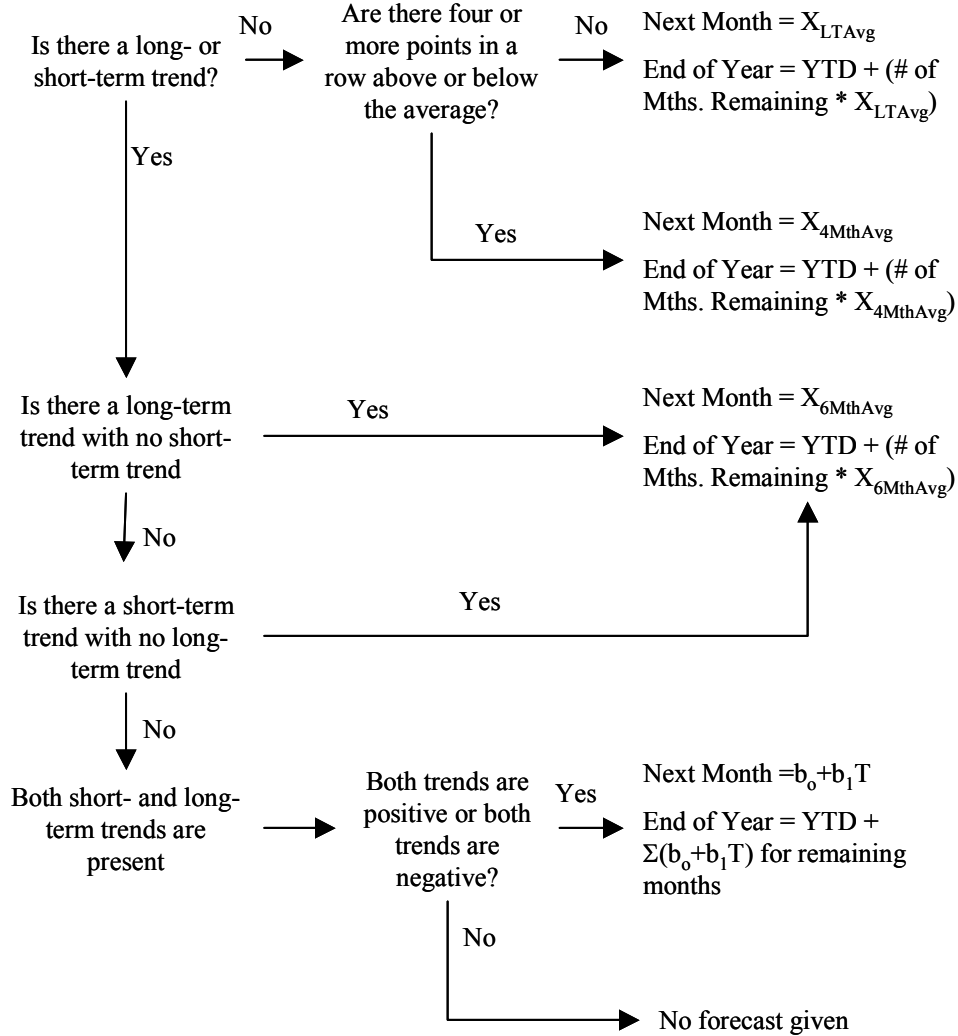
The team needed a process that would be able to do the following for trends:

- Check the data for a long-term trend.
- If there is no long-term trend, perform the normal control chart calculations and generate a control chart.
- If there is a long-term trend, perform the calculations for a trend control chart and generate a control chart.
- Check for a short-term trend.
- Determine if the process is in control for the current month.

FORECASTING

One of the major selling points of using time series charts is the ability to forecast the results. The precision of the forecast varies, but it is usually as close as any other method. The team developed a method to use the data to forecast results based on the time series analysis. The logic they used in forecasting is shown in Figure 5.

Figure 5: Forecasting Logic



If there are no trends and there are not more than four points in a row above or below the average, the forecast for next month is the long-term average (X_{LTAvg}). The forecast for the end of the year is the year-to-date results plus the long-term average times the number of months left in the year. In Figure 1, there are no trends and there is not a run exceeding four points in a row. Thus, the forecasted sales for July 2001 are the average for the time period from January 2000 to June 2001, which is \$903,311. The forecasted sales for the end the year is given by:

$$\text{End of Year Forecast} = \text{YTD Sales} + (\# \text{ of Months Remaining in Year}) * X_{LTAvg}$$

$$\text{End of Year Forecast} = 5,710,777 + (6)(903,311) = \$11,130,643$$

If there is a run exceeding four months in a row below or above the average, the average of the last four months ($X_{4\text{MthAvg}}$) is used in place of the long-term average. If there is a six-month trend, the average for the last six months ($X_{6\text{MthAvg}}$) is used in place of the long-term average. If there is a long-term and short-term trend, the best-fit equation is used to determine the forecast.

The team needed a process that would be able to do the following for forecasting:

- Perform the calculations for the above logic.
- Determine the impact of a six-month trend on the final YTD results if the trend continues.

METHODOLOGY

A system was needed to blend the current financial reporting system with the time series approach. The company had recently implemented a new ERP but this system was not capable of generating anything close to a time-series chart or examining trends. Nothing existed to accomplish this merger.

The team made the decision to develop a Microsoft Excel program to accomplish this. Data are downloaded from the ERP system into an Excel spreadsheet. A macro, written using Visual Basic for Applications, performs the required calculations.

The team designed a spreadsheet to contain the summary data. The first column contained the branch name as well as the division names and company name (for division and company wide-results). The second column contained the financial variables. Over 50 variables were included in the program. The next columns addressed the fifteen items below.

1. The last month result.
2. The average result for the time period.
3. The upper and lower control limits for the variable, i.e., what are the largest and smallest values one can expect for the variable if it is consistent and predictable.
4. Whether the variable is consistent and predictable (in control) for the last month.
5. The number of points in a row above or below the average.
6. Whether a long-term trend in the variable exists, i.e., is the variable increasing or decreasing for the time period.
7. Whether a short-term (six month) trend in the variable exists.
8. The year-to-date (YTD) result.
9. The YTD result for last year at this time.
10. The variance between this year's and last year's YTD.
11. The budget YTD at this time.
12. The variance between this year's and the plan's YTD.
13. The forecasted value for the variable for the next month.
14. If there is a short-term trend and it continues, the impact on the variable at the end of the year.
15. The forecasted end-of-year result for the variable.

Each month, the data are downloaded from the ERP system into either an actual data or plan worksheet. All the calculations are run off these sheets. A time period is selected for the analysis. The normal time period runs from January of the previous year to the last month in the database. For example, if June 2001 were the last month in the database, the program would analyze the results from January 2000 to June 2001. There is an option to let the manager change the starting and ending dates. The results are then put into the summary page.

All the analysis is done before the manager opens the file. When the file is opened, the manager sees his summary page. To see a time series chart, the manager simply double clicks on the variable and the time series chart is developed.

EXAMPLE

As an example, we will use the data in Table 1 plus additional data. The data in Table 1 covers the time frame from January 2000 through June 2001. Suppose the month of July is now complete and that Susan, our branch manager, is examining the results. An example of her spreadsheet for four variables is shown in Figure 5.

Table 5: Spreadsheet Data

Location	Susan's Branch	Susan's Branch	Susan's Branch	Susan's Branch
Variable	Sales	GP \$	GP %	Operating Expense
July 2001 Result	\$ 1,023,000	\$ 240,405	23.5%	\$ 199,456
Average	\$ 909,610	\$ 216,679	23.4%	\$ 200,853
Upper Control Limit	\$ 1,450,404	\$ 340,993	24.3%	\$ 224,588
Lower Control Limit	\$ 368,817	\$ 92,364	22.6%	\$ 177,117
Predictable?	Yes2A	Yes2A	Yes2A	Yes1B
Trend			-0.04%	\$ 3,257
Six Month Trend				\$ 2,455
YTD	\$ 6,733,777	\$ 1,593,707	23.7%	\$ 1,325,715
LYTD	\$ 6,549,966	\$ 1,576,117	24.1%	\$ 1,070,245
Variance from LYTD	\$ 183,811	\$ 17,590	-0.4%	\$ 255,470
YTD Budget	\$ 7,000,000	\$ 1,701,000	24.3%	\$ 1,445,850
Variance from Budget	\$ (266,223)	\$ (107,293)	-0.6%	\$ (120,135)
August 2001 Forecast	\$ 909,610	\$ 216,679	23.7%	\$ 204,109
2001 Forecast if Six Month Trend Continues				\$ 2,359,831
2001 End of Year Forecast	\$ 11,281,828	\$ 2,677,100	23.7%	\$ 2,378,830

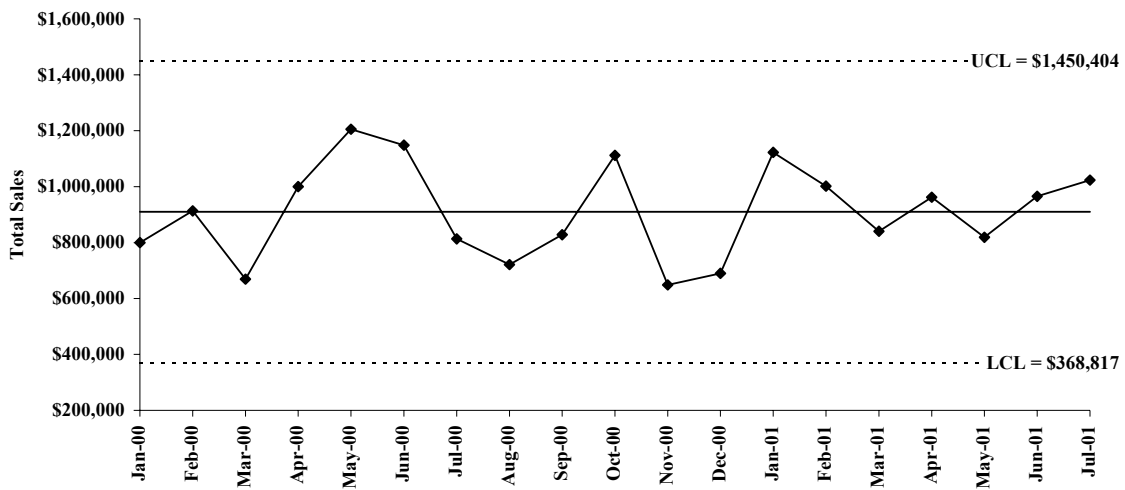
Consider the sales column to start with. From the table, she easily sees that her July sales totaled \$1,023,000. She also sees the average for the time period and the control limits. For July, the process was in control and there are two points in a row above the average. This is the “Predictable?” row. The “Yes” means that the process is consistent and predictable (in control). The number following the yes is the number of points in a row above or below the average. If there is an “A”, it means that there is a run above the average. If there is a “B”, it means that there is a run below the average. This was added as another early warning system. The manager can choose how many months to wait before taking some action. The rule of thumb is to begin investigating any financial variable that has three or four months in a row above or below the average.

There is no long-term or short-term trend. The table gives the year-to-date (YTD) result, the last year-to-date (LYTD) result and the variance between the two. The YTD plan and the variance from YTD are also included. Her sales are better than last year-to-date, but below the budget.

The forecasting is then given. The prediction for August is \$909,610. There is no six-month trend so there is no prediction for the end of the year if the six-month trend continues. The prediction for the end of the year is then given using the forecasting logic described before.

To see the control chart, Susan merely double clicks on the variable and the control chart in Figure 6 is developed.

Figure 6: Monthly Sales Through July 2001



The chart is in control. She knows that her sales will remain in control until she (or some external force) causes the process to change. The only way to improve sales is to fundamentally change the process.

There are three other variables in Table 5. GP \$ is gross profit dollars. This is the amount of money left after the cost of buying the material is subtracted from the sales price. GP % is the gross profit percentage. This is obtained by dividing GP \$ by sales. You want GP % to increase. This means that you are able to buy the material for a smaller percentage of the sales price. The last variable is the operating expense for the branch.

Examining Table 5 shows that the GP \$ is in control and appears to follow sales. The time series chart for GP \$ is shown in Figure 7.

The GP % column indicates that this variable has a long-term trend. It is trending down at a rate of 0.04% per month. This means that it is slowly costing the branch more to buy the material. This lowers gross profit dollars. The chart for this variable is shown in Figure 8. The process is in control. This means that Susan can predict what the impact of decreasing GP % means to the branch.

If the branch averages \$909,610 in sales, a decrease in GP% of .04% means a loss of sales of \$363.84. If this downward trend continues, the impact over the course of 12 months is $363.84 \times 78 = \$28,380$. Thus, the downward trend in GP% is costing the branch \$28,380 annually. And since the process is control, it will continue until the causes for the decrease are found and the process changed to eliminate these causes. However, there is no six-month trend. It is possible that the long-term trend is not present currently.

The last variable is operating expense. It has a short-term and long-term trend. Both trends are positive meaning that the cost of operating the branch is increasing over time. The time series chart for this variable is shown in Figure 9. Over the long-term, the operating expenses are increasing at a rate of \$3,257 per month. Over 12 months, this represents a total increase in operating expense of $78 \times \$3,257 = \$254,046$. The operating expense process is in control. To reverse the trend, the causes of the trend must be found and the process changed to remove these causes.

The two variables, GP % and operating expense, are costing the branch over \$280,000 in a 12 month period. This type of knowledge is not possible from looking only at traditional financial reports. In addition,

Susan knows that, since both are in control, it will take action on her part to change the processes. Continuing to do more of the same will not impact the results. This is the knowledge she gains from the story the picture of the process, the control chart, tells her.

Figure 7: Monthly GP \$ Through July 2001

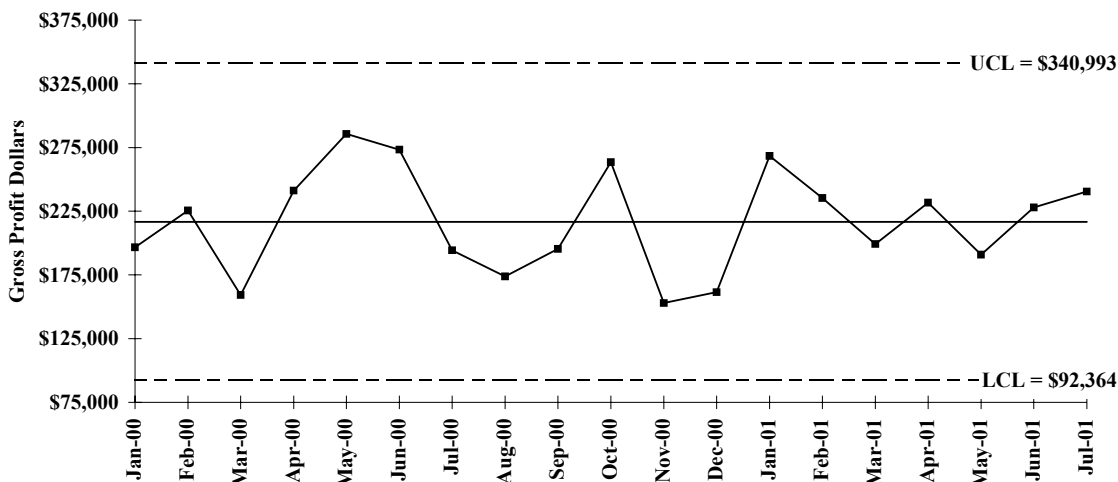
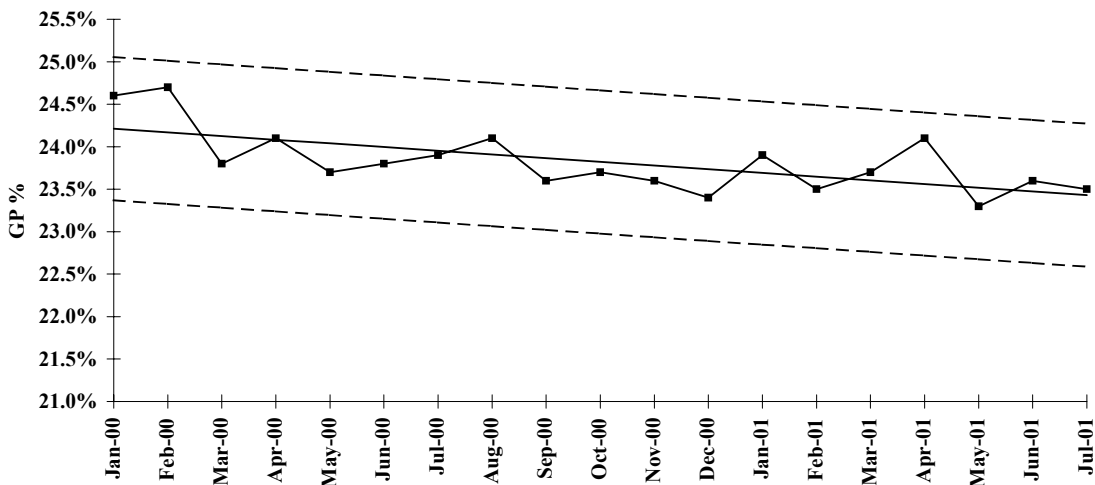


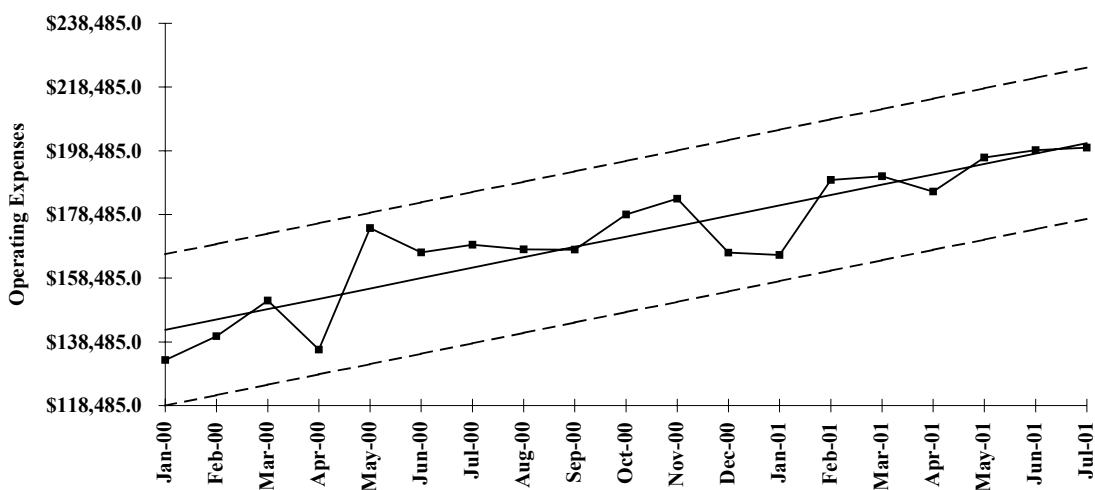
Figure 8: Monthly GP % Through July 2001



APPLYING THE TOOLS OVER TIME

Since this process has become available to the managers and leaders within the organization, a transformation has taken place. First, the data in the time series format is being used in the monthly leadership team meeting and in the sessions with the individual leaders and managers. This usage has created an environment where leadership takes a hard look at data. The charting has created a link between the process control charts and the financial control charts. Managers are learning to react to the time series charts.

Figure 9: Monthly Operating Expenses Through July 2001



Second, using the time series charts in the budgeting process has improved a once regular occurrence to state in budgeting and planning that the process output would increase by X percent or X+ percent over the next quarter or year. These assertions are being met with questions about what element in the process has been examined or improved to support the stated goal. The question, “Is history on your side?” has become a frequent question in the sessions as the budgets and plans are being developed. The charting has given managers a better understanding of the performance of their individual processes.

Third, one challenge has developed in the application of the time series financials. The end of the year audit has created a lag in the publication of the data until the audit is completed. This lag does open a gap between process charts since processes continue from day to day, week to week versus the review that takes place in the financial world. The good news is that requests come in from leaders and managers to accounting each day asking when the charts will be available again.

Finally, since the introduction of the time series financials, the process of sharing financial data with all team members, associates, has become easier. During monthly natural team meetings the use of the charts, which already monitor key process performance, has been extended to the financial performance of the location. The exception reporting available within the program helps us to concentrate as a team on areas that need to be examined.

CONCLUSIONS

By combining the traditional financial reports with a time series analysis, leadership has a much better tool for analyzing the financial performance of all parts of the organization. This approach focuses on the use of trends to provide leadership information they can use to make decisions. Both short-term and long-term trends are used. Forecasting of future results allows leaders to know the impact if trends continue and allows them to take early action.

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