

Title: Using data analytics to explore labor rate and efficiency variances for decision making.

Abstract: Students utilize analytical tools to investigate labor related data of a fictitious company to provide recommendations to senior management about bonus allocation. After interpreting and visualizing the data, students create a formal memorandum to management that highlights their findings and recommendations. In addition to improving students' analytical skills and formal communication skills, this case requires students to utilize critical thinking to assess the ethical implications of their recommendations. This case is most applicable to an undergraduate or graduate managerial accounting course. The case can be completed using various tools such as Excel, Tableau, or PowerBI.

Introduction

Wingo's Widgets is a large privately held company headquartered in Lincoln, Nebraska that provides specialty widgets to companies all over the world. The company was founded in 1960 by Wingo Tillman as a family business employing 5 employees. As of yearend 2020 the company employs over 850 employees. The current CEO of the company is Charles Tillman, Wingo's grandson.

Relevant Personnel

Tonya Griff was hired by Charles Tillman in 2015 as a consultant. The company had been experiencing a period of growing pains leading to order shortfalls and lost revenues. The company lacked the capacity to keep up with thriving demand. Charles was impressed with Tonya's vision to decentralize production to five strategically placed plants throughout the United States. This would allow the company to expand operations while providing regional distribution channels. All five plants were operational by the end of 2017. Tonya was promoted to AVP of Production and was put in charge of managing the plants. Charles gave Tonya permission to hire additional personnel as needed to support operations.

For several months Tonya tried to manage all five plants herself, but quickly realized she was in over her head. It was too difficult managing the day-to-day operation of the five plants when she was physically located at headquarters hundreds of miles away. In April of 2018 Tonya hired five production managers to oversee each of the five locations. As shown in Figure 1, Gregg, Sarah, Lisa, Armando, and Isiah each report directly to Tonya.

Labor Standards and Expectations

While Tonya was skilled at growing the business, dealing with human resource and compensation related items were not in her wheelhouse. She confided in a few of her mentors in similar industries for advice on how to manage her new direct reports. It was recommended that she construct standard labor efficiency and standard labor rates to serve as overall guidance for the plant managers. These standards would serve as benchmarks to help guide each of the managers. Tonya recommended that each manager follow the standards developed, however she allowed each of the managers the flexibility to deviate from standards as they deemed appropriate. Hitting the production target was all that Tonya cared about. For 2020, Tonya informed each manager that they were responsible for processing 20,000 widgets per month (240,000 for the year). Based on the standards, the expected labor cost for each plant would be \$480,000 for the year. See Table 1 for the standards developed by Tonya and her calculation of total labor expense.

Bonus Allocations

Wingo's Widgets had a profitable 2020. In January of 2021, Charles met with Tonya and informed her that there was \$50,000 available in the bonus pool specifically for the five production managers. Tonya was responsible for allocating the bonuses as she saw fit. Tonya recalled that each manager successfully met the goal of processing the 240,000 units requested, so she deemed it fair to reward each of the managers equally. She also looked at the spending variance report and noted that direct labor was slightly a favorable variance. In her mind, each manager must have been on par with the others, and it wasn't worth digging into given the small variance that existed. Tonya sent an email to

the managers to inform them they would each be getting a check for \$10,000. See Table 2 for the Spending Variance report.

The next morning, Tonya got a call from Armando, the plant manager from Texas. After exchanging pleasantries, Armando shared with Tonya that he had some concerns about his bonus. The conversation went as follows:

Armando: Tonya, I was pleasantly surprised that we would be receiving a bonus this year. That said, I was a little surprised that the money was equally split amongst the five of us. I don't want to come across as ungrateful, but would you be able to provide some detail as to how you landed on the equal split?

Tonya: You and the other plant managers worked really hard throughout the year. The bonus was earned and I'm grateful to have you all on my team! I don't see your question as being ungrateful. You know that I try to be as transparent as possible with you. Regarding the allocation, I felt that since each of you met the overall output target, and the overall direct labor variance was slightly favorable, all five of you were performing on par with your peers.

Armando: Tonya, I can appreciate what you said about hitting output targets, and I'm glad each of us were able to do that! However, I see a big issue with how you interpreted the favorable labor variance. The report that you are using is an aggregate of all five locations. It's extremely likely in this case that a favorable variance by one location is hiding the unfavorable variance by another.

Tonya: Hmm... what exactly do you mean? Can you be more specific?

Armando: Well, I made changes this year in my plant. Rather than using the standard hourly wage rate of \$10, I am only paying my employees \$9 per hour. This \$1 decrease from the standard had to have a positive impact on my plants total labor cost, and I believe is responsible for the positive variance you are seeing. In fact, the variance should probably be much higher... which means there are probably issues at other plants that you are missing. For this reason, I think my bonus should be higher than my peers. I found a way to save the company money!

Tonya: Armando, I didn't realize you are paying your employees less than the \$10 per hour standard rate and I can see how that might impact the total labor cost associated with your plant. I think this warrants a deeper dive into the numbers to better understand performance across each of the plants. Thank you for bringing this to my attention. I'm going to reach out to one of the financial analysts to do a deeper dive into the labor variance.

Tonya and Armando ended the call. Tonya called Chip Witherspoon, one of the company's leading financial analysts, and explained to him the situation. Tonya provided Chip with a full dataset of all of the payroll and relevant information needed for him to perform his analysis.

Figure 1: Org. Chart

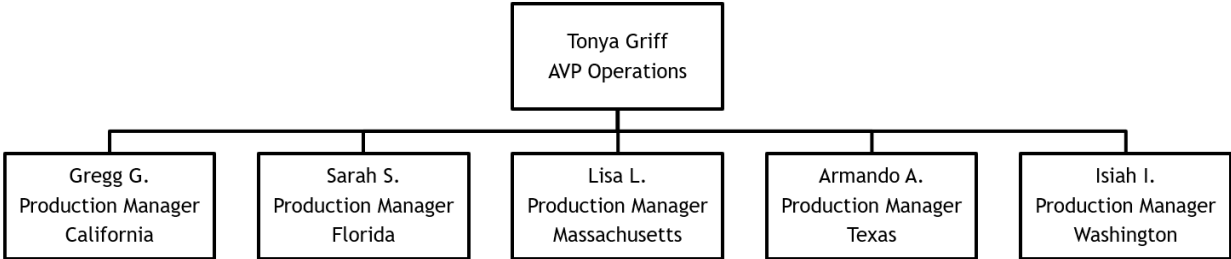


Table 1:

Standards:

Standard Labor Rate per Hour	\$10
Standard Hours Per Widget	0.2

Expectations:

20,000 Widgets processed per month by each location

Calculation:

Widgets Processed (20K x 12 months)	240,000
Standard Hours Per Widget	<u>0.2</u>
Total Standard Hours	48,000
Standard Labor Rate	<u>10</u>
Total Standard Labor Cost per Location	480,000
Locations	<u>5</u>
Total Standard Labor Cost	2,400,000

Table 2:

Wingo's Widgets Production Department Spending Variances For Year Ended December 31, 2020 (In thousands)			
	Actual Results	Flexible Budget	Spending Variances*
Items Processed:	1,200	1,200	
Expenses:			
Direct Materials	3,489	3,450	(39) U
Direct Labor	2,389	2,400	11 F
Overhead	1,545	1,600	55 F
Electricity	47	55	8 F
Rent	350	325	(25) U
Insurance	80	78	(2) U
Misc	<u>14</u>	<u>17</u>	<u>3</u> F
Total Expenses:	<u>7,914</u>	<u>7,925</u>	<u>11</u> F
*The expense variances are labeled favorable (unfavorable) when the actual expense is less than (greater than) the			

Discussion Questions:

1. Looking at Exhibit 1, which of the overall revenue and spending variances do you believe warrant further investigation by Tim? What criteria did you use to come to that decision?
2. Use the information in the included excel file and the information provided by Tonya to calculate the overall labor spending variance for the company.
3. Additionally, you should also calculate the labor rate and labor efficiency variances.
4. To gain further insight into the activities of each location, calculate the overall labor spending variance, labor rate, and labor efficiency variances by location. Provide a visualization that best portrays your findings.
5. What are the positives and negatives of paying all managers the same bonus?
6. What are some advantages and disadvantages of using a spending variance as a mechanism for performance evaluation?
7. Describe the ethical issues present in the case. What ethical issues may come to light if the bonus is paid entirely based on the overall labor spending variance? What about if it's based on the labor rate variance alone? How might management overcome the potential for people to act unethically?
8. Based on your thorough analysis of labor, what recommendations do you have for management surrounding the distribution of the bonuses? Summarize your conclusions in a memorandum addressed to Tim. In the memo, you must clearly communicate your recommendation, while considering the advantages and disadvantages of your recommendation and any ethical implications.
9. As a result of investigating the direct labor rate and efficiency variances for ABC Corp, what has this exercise taught you about the importance of responsibility accounting in budgeting and variance analysis?

Learning Objectives:

After completing this activity, students should be able to:

1. Calculate and interpret the overall labor spending variance, labor rate variance, and labor efficiency variance.
2. Use (a) Excel, (b) Tableau, and/or (c) Power BI to analyze a large data set and create a data visualization that effectively communicates the findings.
3. Think critically about accounting and managerial decisions.
4. Analyze the potential for management decisions to incentivize unethical behavior, and develop suggestions for management to reduce the likelihood of unethical behavior.
5. Communicate the results of an analysis clearly and effectively.
6. Understand the importance of responsibility accounting.

Teaching Instructions

This case is most applicable to an undergraduate or graduate managerial accounting course. The case can be completed using various tools such as Excel, Tableau, or PowerBI. The teaching instructions below utilize excel; however other versions will be available to accommodate other tools. This case can be assigned as an individual or a group assignment depending on the professor preferences.

The following instructions are best suited for an undergraduate class where the students require more hands-on guidance from the professor. It can be easily modified to a graduate class by removing explicit guidance and pointed questions.

Step 1. The professor will have the students read the case materials. Either as a class or in groups, students will discuss the spending variances in Table 2, and the appropriateness of Tonya's decision to skip analysis of the direct labor variance given the small positive variance. Students will also discuss the ethical issues could arise by using variances to dictate bonuses, as well as the ethical issues related to paying employees a living wage.

Potential Questions:

- If you were in Tonya's position, which variances would you prioritize to review first? Why? (Consider variance size, favorability, time available).
- What are some drawbacks of only focusing on negative variances, or large variances?
- What are the advantages and disadvantages of using spending variances as the sole mechanism for performance evaluation?
- What ethical issues may come to light if the bonus is paid entirely based on the overall labor spending variance? What about if it's based on the labor rate variance alone?
- What are the ethical implications of Armando's decision to pay his employees less than the \$10 standard rate suggested by the company in order to achieve a favorable rate variance?

Step 2. Either as a class or in groups, students will discuss the positives and negatives of paying all the managers the same bonus amount and how the decision might impact motivation.

Potential Questions:

- Put yourself in the shoes of Armando. If you believed that you were outperforming your peers, how would you react to the news that everyone was receiving the same bonus?
- How might that news impact your future motivation? Do you feel like you are being incentivized to work hard?

Step 3. Prior to analyzing the data, students will make a recommendation on how they would allocate bonuses at this point. Would they allocate bonuses equally?

Step 4. Either individually or in a group, the students will recreate Table 1 on their own within excel and calculate the company's labor cost based on the standard labor rate and labor hours presented.

Optional: Professors can choose to withhold the original calculation from the students and have them create it on their own without guidance.

Packages	1,200,000	20K packages * 5 location * 12 months
per hour	0.2	
Total Hour	240,000	
wage rate	10	
Budget	2,400,000	

Step 5. The professor will introduce the dataset to the students. The professor will demonstrate to students how to utilize pivot to summarize the data for the entire company and verify that the spending variances reported in Table 2 are correct. The below pivot tables summarize data and show the company's actual total hours spent on labor as well as the average hourly labor wage paid. The students will multiply the total hours and average hour rate together which should equal the Actual direct labor cost presented in Table 2 (rounded). Students will subtract the actual from the standard presented and arrive at the variance of roughly 11K.

The screenshot shows an Excel spreadsheet with a PivotTable. The PivotTable has two columns: 'Sum of Total_Hours' and 'Average of Hourly_Rate'. The values are 239682 and 9.968 respectively. The task pane on the right shows the source data and the fields placed in the PivotTable.

	A	B
1		
2		
3	Sum of Total_Hours	Average of Hourly_Rate
4	239682	9.968
5		
6		2,389,150
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Budget Spend	2,400,000
Actual Spend	2,389,150
	10,850

Step 6: Students will draw on their existing knowledge and manually calculate the labor rate and labor efficiency variance for the company. Professor will work with students to utilize the 3-bucket approach to calculate the labor rate and labor efficiency spending variances.

AH * AR		AH * SR		SH * SR
239,682 * 9.968		239,682 * 10		240,000 * 10
2,389,150		2,396,820		2,400,000
	7,670		3,180	
	Favorable		Favorable	
	Labor Rate Variance		Labor Efficiency Variance	

Formulas:

Labor Rate: $AH(AR - SR) = 239,682 (9.968 - 10) = -7,670$ – Favorable

Labor Efficiency: $SR(AH - SH) = 10 (239,682 - 240,000) = -3,180$ – Favorable

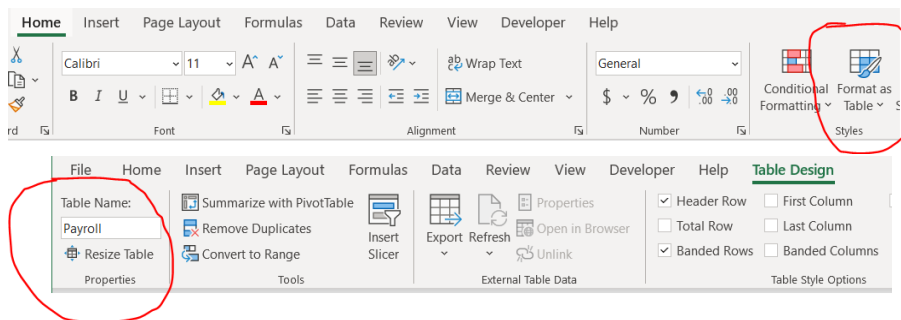
Step 7. The professor will remind the students of their ultimate task: Calculate the labor rate and labor efficiency variances for each of the five divisions. The professor will ask students what modifications could be made to the pivot table in order to see the data summarized by location (at this point, the necessary fields do not exist in the payroll data).

The professor will discuss that data is not always presented in the way we need it in order to run analytics, and modifications / steps might need to be taken to prepare data for analysis.

Specific to this case, the data required is on 2 separate files and will need to be combined so pertinent fields from one table can be added to another. Direct students to utilize VLOOKUP's (or other methods of choice) to bring the "State" field from the HR data into the Payroll table.

Steps:

- Ensure you are on the Payroll tab of the workbook. On the "Home" tab of excel, select "Format as Table". On the "Table Design" tab, rename the table "Payroll".



- Rename column K "State". In cell K2, perform a Vlookup to pull the State field from the HR data and pull it into the Payroll Table.

Formula is `=XLOOKUP([@[EMP_ID]],'HR Data'!A:A,'HR Data'!D:D,0)`

- The result should now show the state for each employee HR record.

	I	J	K
	Other_Taxes	Net_Pay	State
6	72.6	546.14	Florida
9	60.35	585.65	Florida
6	73.47	542.97	Florida
9	58.6	592.01	Florida
4	69.1	558.86	Florida
9	57.73	610.18	Florida
1	62.1	594.29	Florida
3	65.6	561.57	Florida
6	73.47	532.97	Florida
6	72.6	546.14	Florida
4	69.1	548.86	Florida

Optional: Professor can either guide the students through the VLOOKUP as a demonstration or provide the students with a video that demonstrates a VLOOKUP on a different dataset. Students can then take the skills learned in the video and apply it to this case.

<VIDEO COMING SOON>

Step 8. Utilizing the dataset with the included “State” field, the professor will direct students to recreate the pivot table they originally created, but now at the state level. The professor can either demonstrate the pivot table creation or can refer students to the video that covers similar skills over a secondary dataset. <VIDEO COMING SOON>

Have the students save the average hourly rate (AR) and total hours (AH) of each location to the template provided and complete the Efficiency and Rate variances.

Optional: Professor may opt to not provide the students with the template and have the students calculate the labor rate and efficiency variances on their own.

Row Labels	Average of Hourly_Rate	Sum of Total_Hours
California	10.25	46302
Florida	10	48450
Massachusetts	11	38400
Texas	9	57780
Washington	10	48750
Grand Total	9.967741935	239682

Drag fields between areas below:

Filters	Columns
	Σ Values
Rows	Σ Values
State	Average of Hourly_Rate
	Sum of Total_Hours

Blank Template:

			GIVEN				
State	AH	AR	SH	SR	SH (SR - AR)	AH (SH - AH)	Net
California			48000	10			
Florida			48000	10			
Massachusetts			48000	10			
Texas			48000	10			
Washington			48000	10			

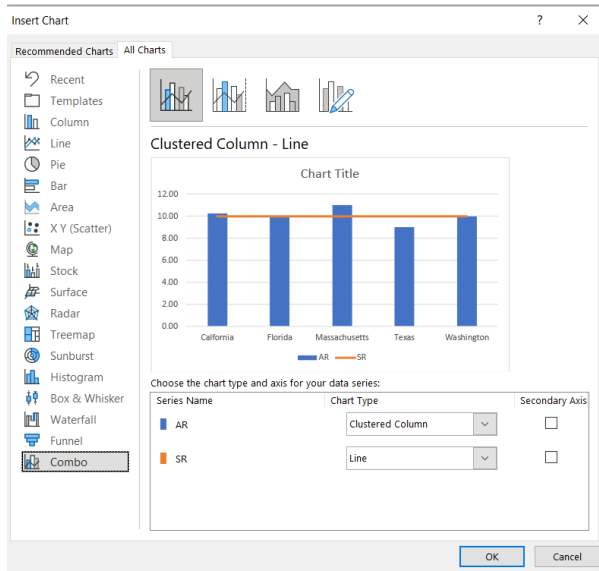
Completed Template:

State	AH	AR	SH	SR	SH (SR - AR)	AH (SH - AH)
California	46302	10.25	48000	10	(12,000)	17,405
Florida	48450	10	48000	10	-	(4,500)
Massachusetts	38400	11	48000	10	(48,000)	105,600
Texas	57780	9	48000	10	48,000	(88,020)
Washington	48750	10	48000	10	-	(7,500)
					(12,000)	22,985

Step 9. Professor will direct students to create visualizations for the labor rate variance, labor efficiency variance, and overall labor spending variance for each location. The professor can either demonstrate the pivot table creation or can refer students to the video that covers similar skills over a secondary dataset. <VIDEO COMING SOON>

Students will create data visualizations to display the results for management. Chart one reports each locations rate versus the standard. Chart two reports the hours of each location versus the standard. Finally, chart three shows the results of variances

Chart 1: instructions. Select the State, AR, and SR columns. Insert chart.



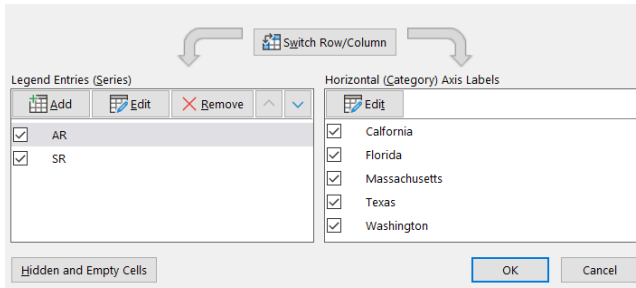


Chart 2:

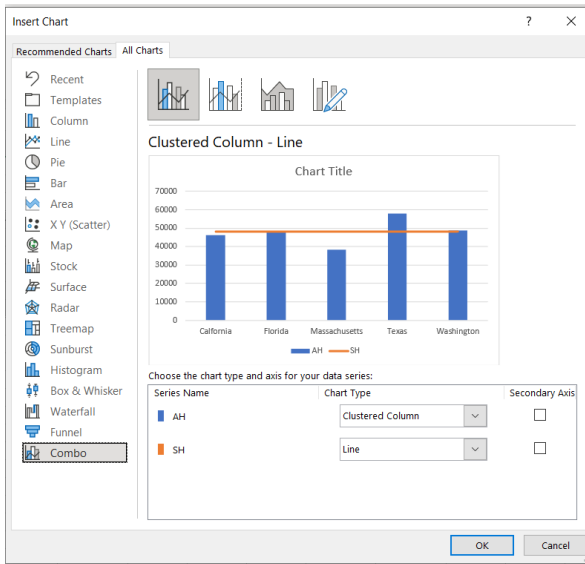
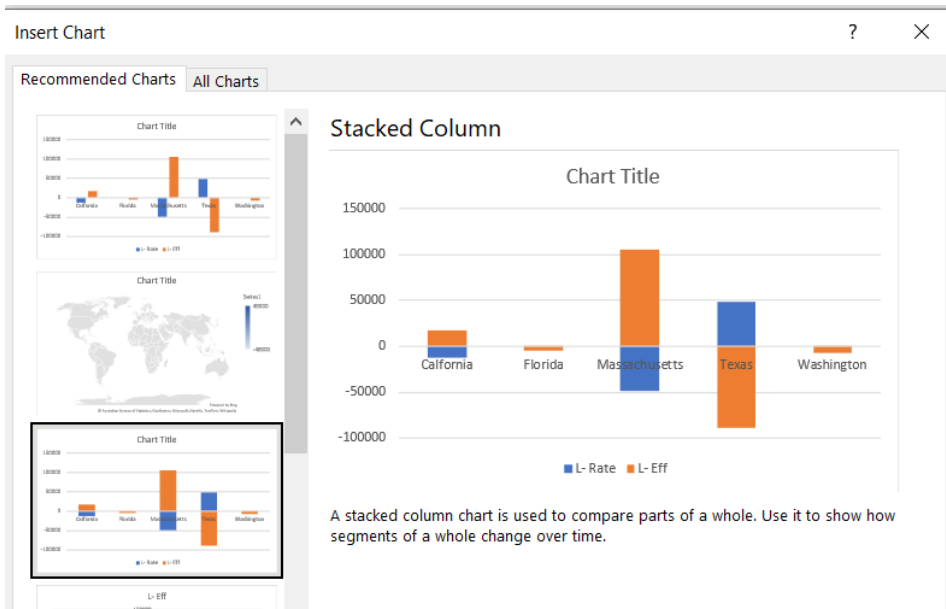


Chart 3:



Step 10: Either as a class or in groups, students will review the visualizations and discuss the performance of each location.

Potential Questions:

- Ignoring all else, what location had the best labor rate variance?
- Ignoring all else, what location had the best labor efficiency variance?
- What location had the best performance when taking both variables into account?
Explain in your own words what is taking place at this location.

Step 11: Either as a class or in groups, the professor should ask students to revisit the bonus allocation proposed by Tonya, and the issues noted by Armando in Texas. Based on the data analysis, ask students to assess the merits of Armando's claim that he should receive the highest bonus. Students should be asked how they would allocate bonuses at this point.

Optional: If the assignment was performed in groups, the professor can reconvene the class and have each group make a recommendation of how they would allocate bonuses and why. The primary takeaway is that Texas underpaid their employees which led to a favorable rate variance, however it appears the employees were less efficient, and resulted in a negative spending variance. The opposite happened in MA. They paid their people above average, which resulted in efficiency gains that outweighed the cost of increased wages.

Step 12: Either individually or in groups, students will write a formal memorandum to Tanya. Students will make recommendations on how bonuses should be allocated based on their analysis. Students must clearly communicate recommendations while considering the advantages and disadvantages of their recommendations and any ethical implications.