Hobbs communication devices: Using variance analysis to improve budgeting

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ABSTRACT

A small manufacturing firm is struggling to properly compare budgeted and actual financial data. Students are asked to provide analysis and recommendations for improvement. Specifically, this case is designed to help introductory managerial accounting students appreciate how budgeting and variance analysis are interdependent. Students are required to interpret variances to inform standard costs in the subsequent year's budgets.

Keywords: Budgeting, Variance Analysis, Cost Estimation

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INTRODUCTION

Jack Hobbs is nervous about his company's future performance. The Hobbs family own 40% of the shares of Hobbs Communication Devices, and generally has control over the direction of the company. In fact, Jack is currently the CFO and a member of the Board of Directors. However, outside shareholders are becoming increasingly anxious due to poor operating results from the past few years.

You have been hired by Jack into the controller's office to provide some fresh perspectives about operations at Hobbs Communication Devices. For your first assignment, Jack asks you to review the financial information from the last fiscal year and to help create a budgeted plan for the next fiscal year. To help you complete this assignment, Jack has provided you with various financial data relating to the previous fiscal year as well as a brief synopsis of the firm's business model.

HOBBS COMMUNICATION DEVICES – COMPANY OVERVIEW

Hobbs Communication Devices makes two types of specialized receivers for satellite communication reception: an advanced and a basic device. At the beginning of each fiscal year, the company creates a projected income statement for planning purposes. The budgeted income statement for the past fiscal year and standard cost information used to create the budget are provided in Tables 1 and 2 (Appendix).

Currently, the company uses a plant-wide predetermined manufacturing overhead rate to apply manufacturing overhead to its products. All production units go through two production departments: Electrical Components (where the electrical components in each receiver are produced) and Assembly (where the receivers are assembled). Also, the company employs a just-in-time inventory system for all of its inventory types (raw materials, work-in-process, and finished goods inventory). Because Hobbs Communication Devices supplies major satellite companies, the company can generally predict production needs a month in advance. Thus, the company carries little or no balances in any inventory account. For example, the raw materials manager only buys circuits and nickel when it will be immediately used in production and no real inventory of materials is kept on hand. However, if the market price of a material decreases by 10% or more than the standard price, the company has authorized the purchasing manager to build up the raw material inventory balance.

Jack is concerned because 2013 actual year-end income fell short of projected income for the third straight year. He would like your help to understand the causes of the difference between projected income and actual income, and what actions he should take to improve income going forward. Jack has provided you with the actual income statement in Table 3 (Appendix), a comparison of the static budget, flexible budget, and actual income statement in Table 4 (Appendix), and a variance report for the 2013 fiscal year in Table 5 (Appendix) to assist your analysis of why the company fell short of projections in 2013.

Jack has also provided you with some additional information that should be helpful in understanding why 2013 income was so much lower than expected. He has been in the business long enough to realize that this difference is not necessarily just the result of inefficient workers or substandard inputs. He notes that the company changed its pricing and selling strategy very early in the fiscal year (but after the budget was set) in an attempt to jumpstart sales in the recessionary economy. In January, the company also decided to purchase integrated circuits

from a new supplier that offered a lower price. Last year, the company eliminated one sales position, eliminating the cost for the salary of this salesperson. However, after extended labor negotiations, Hobbs increased the wage rate of the factory employees to $15 per hour at the beginning of the fourth quarter. The firm also eliminated an employee training program that represented a $145,000 savings in administration costs. Unfortunately due to poor cash planning, the company had an unexpected cash shortage in September. Thus, the firm needed a costly emergency short-term loan that significantly increased the interest costs for Hobbs Communication Devices.

LOOKING FORWARD – PLANNING FOR THE 2014 FISCAL YEAR

On the advice of outside shareholders, Jack has agreed to change its product pricing for the upcoming fiscal year. After in-depth market research, the firm is planning on charging $190 for an advanced receiver and $140 for a basic receiver. Due to a projected improvement in the overall economy, the sales teams believes they can sell 350,000 units of the advanced receiver and 300,000 units of the basic receiver at those prices.

In looking at the production costs, some changes are needed in the standard costs used for budgeting and planning purposes. Unless the results of your variance analysis suggest otherwise, all of the standard usages (e.g., ounces of nickel per unit, number of integrated circuits per unit, machine hours per unit, and direct labor hours per unit) should remain the same as last year for the upcoming fiscal year. The company has no operational plans to change the manufacturing process that will affect the standard efficiency in using these resources. However, each year Hobbs Communication Devices updates its standard direct materials costs (e.g., cost of nickel per ounce) to better match current prices. Jack also wants advice if Hobbs should continue to purchase integrated circuits from the new supplier or go back to the old supplier. Finally, as a result of the labor negotiations with factory workers, the average hourly pay rate is expected to remain at $15.00 per direct labor hour next year.

A recent accounting hire at Hobbs Communication Devices has analyzed the manufacturing overhead costs at the company. Specifically, she examined past manufacturing overhead costs in each of the two production departments and regressed these costs on various potential cost drivers. Jack is unsure how to best use this data. Results from this analysis are in the Table 6 (Appendix).

Predicting the non-manufacturing costs for the upcoming fiscal year is relatively simple. Jack doesn't expect any changes in the sales persons' salaries from last year's actual amount of $425,000. The commission rate will also remain at 2 percent. The fixed administrative costs are also expected to remain the same as last year's budgeted amount. Further, due to better cash management, the firm expects interest costs to be in line with last year's projections.

REQUIRED

(1) Clearly describe what decisions and choices may have led to the variances in Table 5. Indicate what other information you would want to find out and who you would ask to provide the desired information. Give suggestions for improvement where applicable.
(2) Using your analysis in requirement 1, provide a recommendation on whether or not Hobbs Communication should continue with the current integrated circuit supplier.

(3) Complete a standard cost card for the fiscal year 2014. Provide justifications for each value on the standard cost card.
(4) Using the standard cost card for the fiscal year 2014 you created in requirement (3), create a projected contribution format income statement for 2014. Assume that the projected interest expense is $520,000.
(5) Wrap up questions:
    a. In general, why do variances arise?
    b. How can actual information inform standard costs?
    c. How can standard costs inform actual performance?
    d. What are the advantages and weaknesses of the contribution format income statement relative to the traditional format income statement as a budgeting tool?
    e. Are there any other recommendations that you want to give to Jack Hobbs?

TEACHING NOTE

Intended Course, Learning Objectives, and Teaching Plan

This case is targeted for use in an undergraduate, introductory managerial accounting course. Introductory managerial accounting courses are typically taught as a series of disjointed topics, with little effort to understand the relationships between these topics. In a common sequence, profit planning principles are introduced before variance analysis, allowing students to understand how variance analysis acts a control mechanism. However, introductory students rarely understand how variances also inform future budgets. This case helps students better understand the interdependencies between these topics.

Student Preparation for the Case

This case uses a fictional manufacturing firm and requires students to interpret a variance analysis and then create a budgeted income statement for the upcoming fiscal year. Thus, students need some basic understanding of variance analysis, profit planning, and budgeting principles. The case also incorporates some basic cost estimation principles. This case is best used to review budgeting and variance analysis after students gain some basic understanding of these principles. The assigned exercises are also most easily completed in a spreadsheet software program such as Microsoft Excel. Students should have access to and knowledge of such software.

Teaching Plan

This case can be adapted to numerous teaching situations. The most successful implementation will likely require students to complete the case requirements outside of class. Instructors can then use all or part of a subsequent class session to review the case and discuss various assumptions and strategies taken by students. Possible discussion points are presented in the next section, “Suggested Responses to Student Requirements.” The case can be assigned individually or in groups. If students request more information, we suggest asking students to make plausible assumptions to complete the case. However, enough information is given in the case to complete all numerical answers.

Suggested Responses to Student Requirements

1. Clearly describe what decisions and choices may have led to the variances in Table 5. Indicate what other information you would want to find out and who you would ask to provide the desired information. Give suggestions for improvement where applicable.

The efficiency variances are summarized in Table 5 of the case. Instructors may wish to emphasize the discussion points below when reviewing the case solution during class. We have also provided suggestions how to differentiate B-level and A-level students if the case is graded.

a) Sales variances: All students should identify three key issues surrounding the sales variances. First, the overall sales volume variance is $51,000 unfavorable, indicating that overall sales volume was less than expected. The overall price variance is also unfavorable, indicating that the overall sales price was less than expected. Second, students should recognize the inverse relation between sales price and sales volume. The advanced receiver has an unfavorable sales price variance, but a favorable sales volume variance, suggesting that the sales agents may have lowered the sales price to spur an increase in sales volume, which appears to be supported by the data presented. On the other hand, the basic receiver has a favorable sales price variance, but an unfavorable sales volume variance. Third, students should indicate that further investigation of these variances should begin with the sales department, since the sales team has the most control over sales prices.
    a. B-level responses will further evaluate whether the inferred pricing decisions (and associated price/volume tradeoff) increased overall earnings by comparing the magnitude of the sales price and sales volume variances for each type of receiver. For the advanced receiver, the sales price variance is $1,600,000 U, while the sales volume variance is only $250,000 F. Thus, the price/volume tradeoff did not increase firm value, because the pricing/volume decision reduced profits by a net of $1,350,000. For the basic receiver, the sales price variance is $1,400,000 F, and the sales volume variance is $420,000 U. Thus, the sales managers correctly interpreted the price/volume tradeoff in his or her pricing/output decision for basic transistors. These choices successfully increased profits by a net of $980,000 for the basic receivers.
    b. In addition to the analysis above, A-level responses should also identify the actual and standard sales prices and possibly calculate the price elasticity of demand. For the advanced receiver, the actual sales price is equal to $170 ($54,400,000 / 320,000 advanced receivers), while the standard sales price is $175 ($52,500,000 / 300,000 advanced receivers). The actual sales volume of advanced receivers is 20,000 units less than expected. Thus, the price elasticity of demand for advanced receiver equals 2.33 [(20,000 / 300,000) / (5 / 175)], implementing a simple price elasticity formula. For the basic receiver, the actual sales price is equal to $140 ($39,200,000 / 280,000 basic units), while the standard sales price is $135 ($47,250,000 / 350,000 basic units). The actual sales volume of basic receivers is 70,000 units lower than standard or expected volume. Hence, the price elasticity of demand for the basic receiver is 5.4 [(70,000 / 350,000) / (5 / 135)].

b) Direct material variances: All students should identify three key issues surrounding the direct material variances. First, students should recognize that nickel has both a favorable price and a favorable quantity variance, indicating that nickel was purchased at a lower price than expected, and that less nickel was used in production than was expected. Second, all students should recognize that integrated circuits have a favorable price variance and an unfavorable quantity variance, indicating that the integrated circuits were purchased for a lower price than expected, but that Hobbs used more integrated circuits in production than expected. Students should also be aware that the variance pattern for integrated circuits is consistent with the typical price/quantity tradeoff commonly observed in many real-life situations. Thus, students will likely have more difficulty explaining why the nickel variances are both favorable. Third, students should indicate that further investigation of the price variance should begin with the purchasing manager, while further investigation of the quantity variances should begin with the production manager.
    a. B-level responses should take the analysis further by evaluating whether purchasing integrated circuits at a lower price than expected was worth the additional quantity of integrated circuits required to make the receivers. Specifically, students should point out that the $3,001,500 F integrated circuits price variance did not outweigh the $3,520,000 U integrated circuits quantity variance.
    b. Beyond the expected analysis above, A-level responses will identify the actual changes in per unit price and quantity for the direct materials and also discuss the integrated circuits price/quantity tradeoff in more detail.
        i. The actual price paid for nickel is $2.46 per oz. ($10,652,784 / 4,330,400 oz.). The actual quantity of nickel used for the advanced product is 5.92 oz. per advanced receiver (1,894,400 oz. / 320,000 advanced receivers). The actual quantity of nickel used for the basic receiver is 8.70 oz. per basic receiver (2,436,000 oz. / 280,000 basic receivers). For both products, less nickel was used than expected. Because nickel has both a favorable price and quantity variance for both products, the buyer's market for nickel appears to be improving.
        ii. The actual price paid for integrated circuits is $19.70 per oz. ($25,708,500 / 1,305,000 integrated circuits), which is 10.5% less than the standard purchase price. Because this decrease in price is greater than 10%, the purchasing manager appears to have purchased more material than was actually used to build up inventory. Specifically, the manager purchased 1,305,000 integrated circuits while the production departments only used 1,080,000 integrated circuits. The actual amount of integrated circuits used for the advanced product is 2.50 integrated circuits per advanced receiver (800,000 integrated circuits / 320,000 advanced receivers). The extra 0.50 circuit is consistent with workers needing to scrap one circuit for every two advanced receivers. The actual amount of integrated circuits used for the basic product is 1.00 integrated circuits per basic receiver (208,000 integrated circuits / 280,000 basic receivers). Thus, the advanced receiver required, on average, 0.50 more integrated circuits per unit than expected, while the basic receiver required the exact quantity

expected from the quantity standard. This analysis suggests that the unfavorable integrated circuit quantity variance is completely due to the often scrapped integrated circuit used to produce advanced receivers. Students may suggest reasons for the additional integrated circuits used in the advanced receiver, such as lower quality integrated circuits that led to more waste for the more advanced receiver. More discussion related to case question 2 in the case could be included at this point in a class presentation.

c) Direct labor variances: All students should recognize that the unfavorable price and quantity variances for direct labor are a result of paying a higher hourly wage for labor than expected, and that the employees took longer than expected to make the receivers. More information about the causes of these variances should be gathered from the production and/or human resources managers about these variances.
    a. Beyond the analysis above, B-level responses should combine the variances with facts from the case to conclude why both the labor price and quantity variances are unfavorable. Specifically, Jack indicates that Hobbs was involved in extensive labor negotiations during the year before increasing the hourly wage rate from $14 to $15 during the fourth quarter. This suggests that for the first three quarters of the year, employees were not satisfied with their wages, causing employees to work less efficiently.
    b. A-level responses would go further by determining the actual hourly wage rate and the actual per-unit quantity of labor for each transistor in each department.
        i. The actual hourly wage rate was $14.25 per hour ($18,331,200 + $16,837,800) / (323,200 + 565,600 + 963,200 + 616,000 labor hours). Please note that assuming an even distribution of production throughout the year, this actual wage rate coincides with the increase from $14 to $15 per hour during the fourth quarter.
        ii. For the advanced receiver, the actual amount of labor hours worked is 1.01 hours per receiver in the electrical department (323,200 labor hours / 320,000 advanced receivers) and 3.01 hours per receiver in the assembly department (963,200 labor hours / 320,000 advanced receiver). Comparing the actual labor hours to the standard labor hours, employees working on the advanced receiver were less efficient than expected in both departments.
        iii. For the basic receiver, the actual amount of labor hours worked is 2.02 labor hour per receiver in the electrical department (565,600 labor hours / 280,000 basic transistors), and 2.2 labor hours per receiver in the assembly department (616,000 labor hours / 280,000 basic receivers).
        iv. Comparing the actual labor hours to the standard labor hours, employees working on the basic receiver were less efficient than expected in both departments. This is consistent with employees who, unsatisfied with their wage of $14 per hour, were not motivated to work as efficiently.

d) Manufacturing overhead variances: All students should recognize that the $26,600 F electrical components MOH efficiency variance indicates fewer machine hours were used than expected in the electrical components department, while the $57,000 U assembly MOH efficiency variance indicates that more machine hours were used than expected in

the assembly department. The $977,280 U MOH price variance indicates that the actual MOH rate per machine hour is higher than expected. More information about the causes of these variances should be gathered from the production manager.

a. B-level responses should further indicate that the current MOH variances as calculated are not very useful since they combine fixed overhead with variable overhead.
b. A-level responses will find the actual MOH rate and machine hours used for each product in each department and will recognize that the unfavorable MOH price variance is partially a result of combining fixed overhead in the MOH rate and the overall fewer number of machine hours used.
    i. The actual MOH rate is $9.90 per machine hour [($16,315,200 + $7,872,480) / (960,000 + 277,200 + 688,000 + 518,000 machine hours)], which is $0.40 per machine hour more than the standard rate.
    ii. A-level students should recognize that because Hobbs combines both fixed and variable MOH into a single, plant-wide overhead rate, the actual MOH rate per machine hour can be affected not only by the actual costs (e.g., utility rates), but also by the number of machine hours used. Thus, the MOH price variance could be more informative if it were based only upon the variable MOH portion. Students could also verify the predetermined MOH rate and show how it is affected by the number of machine hours. Specifically, Hobbs' budgeted MOH rate is based on budgeted MOH of $24,225,000 ($14,250,000 + $9,975,000), and 2,550,000 total budgeted machine hours (1,500,000 for the advanced receiver = 300,000 advanced receiver* 5 machine hours per advanced receiver; 1,050,000 machine hours for the basic receiver = 350,000 basic receiver* 3 machine hours per basic receiver). Dividing the $24,225,000 by 2,550,000 results in the predetermined overhead rate of $9.50 per machine hour. Because Hobbs used 106,800 fewer machine hours than expected (2,550,000 budgeted machine hours – 2,443,200 actual machine hours = 960,000 + 277,200 + 688,000 + 518,000 machine hours) and the regression estimates from Table 6 indicate that approximately $4,900,000 of the overhead is fixed with respect to machine hours, then the actual fixed overhead rate would have increased from the budgeted $1.92 per machine hour ($4,900,000 / 2,550,000 machine hours) to $2.01 per machine hour ($4,900,000 / 2,443,200 machine hours) even if the actual total fixed overhead costs did not change. Thus, approximately $0.09 of the $0.40 increase in the MOH rate is due just to a decrease in the actual number of machine hours.
    iii. For the advanced receiver, the actual number of machine hours is 3 machine hours per advanced receiver in the electrical department (960,000 machine hours / 320,000 advanced receivers), and 2.15 machine hours per advanced receiver in the assembly department (688,000 machine hours / 320,000 advanced receivers). Thus, more machine hours were used on the advanced receivers only in the assembly department.
    iv. For the basic receiver, the actual number of machine hours is 0.99 machine hours per basic receiver in the electrical department (277,200

MH / 280,000 basic receivers), and 1.85 machine hours per basic unit in the assembly department (518,000 MH / 280,000 basic receivers). Thus, fewer machine hours were used on the basic receiver in both departments.

e) Other variances: All students should appropriately interpret the "signs" of the other variances. Specifically, the $4,000 F commission variance means that actual commissions were $4,000 less than expected. The $25,000 F salaries fixed cost variance indicates that salaries were $25,000 less than expected. The $145,000 F fixed administrative cost variance indicates that the fixed administrative costs were $145,000 less than expected. Lastly, the $110,000 U interest cost variances indicates that the interest costs were $110,000 more than expected.
    a. B-level student analyses will link the case facts to the variances. Specifically, the $4,000 F commissions variance is a result of revenue being $200,000 less than expected. The $25,000 F fixed administrative cost variance is likely the result of eliminating the salesperson's salary. The $145,000 F fixed administrative variance is a result of eliminating employee training program. Finally, the $110,000 U interest cost variance is a result of having to obtain the costly emergency loan.
    b. A-level responses might further try to reconcile the total differences between the actual income statement, the flexible budget, and the static budget. In doing so, these students will need to adjust the direct material quantity variances so that they're based on the material used, and not the material purchased (we discuss this in more detail in the next question).

2. Using your analysis in requirement 1, provide a recommendation on whether or not Hobbs Communication should continue with the current integrated circuit supplier.

Answer: While we believe a strong argument can be made that Hobbs should go back to its original supplier of integrated circuits, the actual recommendation is not as important as the justifications used to make the recommendation. This question should encourage students to compare the price and quantity variance tradeoff for integrated circuits. All students should recognize that the net $518,500 U integrated circuit variance suggests that the decrease in price from the new integrated circuit vendor was offset by an increase in quantity.

B-level responses should give a more nuanced analysis by discussing the integrated circuit quantity variance for each type of receiver. As already mentioned, Hobbs used 25 percent more integrated circuits than expected for the advanced receiver and exactly the per-unit standard amount for the basic receiver. Thus, the integrated circuits from the new supplier could have beneficial use in the basic receiver, assuming that it did not decrease the quality of the receiver. Thus, Hobbs may want to use the remaining integrated circuits that were purchased this period to make basic receivers, and buy integrated circuits from the old supplier for the advanced receiver during the next year.

A-level responses should identify that the $518,500 U total netted integrated circuit variance is understated because the favorable price variance is based on all the integrated circuits purchased, while the integrated circuit quantity variance is based only on the material used. If the integrated circuit price variance were based only on the material used (thereby providing a more consistent comparison to the integrated circuit quantity variance), the total netted integrated circuit price variance would decrease from $3,001,500 F to $2,484,000 F [(800,000 integrated

circuits + 280,000 integrated circuits)*($22 - $19.7)]. Thus, the impact of the integrated circuit variances on currently reported income is $1,036,000 U ($3,520,000 U "minus" $2,484,000 F). Students may also point out the inventory carrying costs are likely to increase as a result of carrying so many integrated circuits in inventory.

3. Complete a standard cost card for the fiscal year 2014. Provide justifications for each value on the standard cost card.

Answer: One possible recommended standard cost card is shown in Table 7. Once again, the actual standard costs reported are less important than the justifications used to support these figures. The rule of thumb that we used to create this cost card is to continue to use the standards from the previous year, unless: (1) the actual data differed by 10 percent or more, or (2) Hobbs' policy explicitly indicates when to change the standards. Our proposed justification for each standard is below:

a. Nickel: Because Hobbs updates its direct materials costs to better match current prices, we updated the standard cost of nickel to $2.46 per oz. represent the actual average market price paid during the previous year.
b. Integrated Chips: Because we decided that Hobbs should return to the original supplier of integrated circuits, we used the standard costs and usages of integrated circuits from the previous year's standard cost card when Hobbs had planned on using the original supplier of integrated circuits.
c. Direct Labor: Only the actual direct labor hours in the assembly department for the basic receiver changed by at least 10 percent. Thus, we increased the standard amount of direct labor in the assembly department for the basic receiver to 2.2 direct labor hours per basic unit, which represents the actual number of direct labor hours required during the past year. Also, because the wage rate is expected to be $15 going forward, we used $15 as the standard wage rate.
d. Manufacturing Overhead: Because the actual machine hours did not change at least 10 percent for either receiver, we left the standard machine hours the same as listed from the previous year's standards. However, we did update the predetermined overhead rate to reflect the results from the regression analysis.
    i. We used the results from the regression model using machine hours to estimate MOH costs in the electrical department because machine hours best explains these costs (i.e., machine hours has the highest R^2). Accordingly, our estimate for the variable MOH in the electrical department is $13 per machine hour and fixed costs are estimated to be $2,800,000.
    ii. We used the results from the regression model using direct labor hours to estimate MOH costs in the assembly department because it has the highest R^2 and best explanatory power. Accordingly, our estimate for the variable MOH in the assembly department is $3 per direct labor hour and fixed costs are estimated to be $1,750,000.
    iii. Because the MOH standard costs in this cost card separate the variable costs from the fixed costs, the accuracy of the MOH estimates is expected to be more reliable. Moreover, once the year is over the variances should

be more meaningful since we can factor out the impact of making more or less units than expected.

4. Using the standard cost card for the fiscal year 2014 you created in requirement (3), create a projected contribution format income statement for 2014. Assume that the projected interest expense is $520,000.

Answer: The budgeted income statement that is based on our standard cost card is shown in Table 8 (Appendix).

5. Wrap up questions:
    a. In general, why do variances arise?
    Answer: Variances arise because actual inputs, prices, and volumes deviate from what was expected. This case is meant to provide just a few examples of why deviations from expectations arise. Specifically, the following conditions contributed to the observed variances:
        i. Changes in market conditions for the product may lead to unanticipated price and volume changes.
        ii. Changes in market conditions for the material used to make the product, as observed with the nickel.
        iii. Changes in suppliers for the material used to make the product, as observed with the integrated circuits.
        iv. Changes in market wage rates as observed with the direct labor.
        v. Poor estimation techniques as observed with the MOH and interest costs.
        vi. Efforts to reduce costs as observed with the reduction in salespersons and training programs.
    b. How can actual information inform standard costs?
    Answer: Actual information provides feedback about the quality of the plans; however, as observed in this case, deviations from the plans are not necessarily due to poor planning. Specifically, changes in market conditions cannot always be predicted. When such changes occur, it is important to update plans to reflect those changes.
    c. How can standard costs inform actual performance?
    Answer: Standard costs inform actual performance in several ways. First, standard costs help to set expectations about future profitability, cash needs, and return on investment. Second, standard costs help increase return on managements' time by highlighting areas that need managements' attention. Third, standard costs help managers interpret the extent to which actual results are due to poor planning versus changes in market condition.
    d. What are the advantages and weaknesses of the contribution format income statement relative to the traditional format income statement as a budgeting tool?
    Answer: The contribution format income statement has two main advantages. First, it helps managers get a better idea of how changes in input quantity, prices, and sales volume will affect profitability, cash flow, and return on investment. Second, it helps managers better understand the profitability of the different

segments of their organization and how overall firm profitability will be affected by changes in these segments.
The main disadvantage to the contribution format of the income statement is that it does not show management how GAAP income will be affected by changes in input quantity, prices, and sales volume.

e. Are there any other recommendations that you want to give to Jack Hobbs?
Answer: Students can list a number of different recommendations. For instance, students can comment on the relative profitability of each product line. Specifically, based on the standard cost card that we provide, the budgeted contribution margin per unit is $19.44 for the advanced receiver ($6,804,000 / 350,000 advanced receivers), and $21.46 for the basic receiver ($6,438,000 / 300,000 receivers). Thus, all else equal, if managers can shift the sales mix towards more basic receivers, Hobbs' overall profitability should increase. Students can also talk about whether the projected sales figures are consistent with the price elasticity of demand.

APPENDIX

TABLE 1: BUDGETED INCOME STATEMENT FOR FISCAL YEAR 2013

Advanced	
Revenues (Projected Sales = 300,000 units)	$ 52,500,000
Direct Materials	$ 17,700,000
Direct Labor	$ 16,800,000
Applied Manufacturing Overhead	$ 14,250,000
Gross Margin - Advanced	$ 3,750,000
Basic	
Revenues (Projected Sales = 350,000 units)	$ 47,250,000
Direct Materials	$ 15,575,000
Direct Labor	$ 19,600,000
Applied Manufacturing Overhead	$ 9,975,000
Gross Margin - Basic	$ 2,100,000
Total Gross Margin	$ 5,850,000
Period Costs	
Commissions (2 percent of revenues)	$ 1,995,000
Salesperson Salaries	$ 450,000
Fixed Administrative Costs	$ 1,650,000
Interest	$ 520,000
Pre-Tax Income	**$ 1,235,000**

TABLE 2: STANDARD COST CARD FOR FISCAL YEAR 2013

	Advanced Receiver	Basic Receiver
Direct Materials		
Ounces of Nickel per Unit	6.00	9.00
Cost per Ounce of Nickel	$ 2.50	$ 2.50
Number of Integrated Circuits per Unit	2.00	1.00
Cost per Integrated Circuit	$ 22.00	$ 22.00
Direct Labor		
DL Hours per Unit (Electrical Components)	1.00	2.00
DL Hours per Unit (Assembly)	3.00	2.00
Total DL Hours per Unit	4.00	4.00
Cost per DL Hour	$ 14.00	$ 14.00
Manufacturing Overhead (machine hours is the chosen cost driver)		
Machine Hours per Unit (Electrical Components)	3.00	1.00
Machine Hours per Unit (Assembly)	2.00	2.00
Total Machine Hours per Unit	5.00	3.00
Pre-Determined MOH Rate per Machine Hour	$ 9.50	$ 9.50

TABLE 3: ACTUAL INCOME STATEMENT FOR FISCAL YEAR 2013

Advanced		
Revenues (Projected Sales = 320,000 units)	$	54,400,000
Direct Materials[1]	$	20,420,224
Direct Labor[2]	$	18,331,200
Applied Manufacturing Overhead[3]	$	16,315,200
Gross Margin - Advanced	$	(666,624)
Basic		
Revenues (Projected Sales = 280,000 units)	$	39,200,000
Direct Materials[1]	$	11,508,560
Direct Labor[2]	$	16,837,800
Applied Manufacturing Overhead[3]	$	7,872,480
Gross Margin - Basic	$	2,981,160
Total Gross Margin	$	2,314,536
Period Costs		
Commissions (2 percent of revenues)	$	1,872,000
Salesperson Salaries	$	425,000
Fixed Administrative Costs	$	1,505,000
Interest	$	630,000
Pre-Tax Income	**$**	**(2,117,464)**

1: Direct Materials

Actual Nickel Used (Advanced)		1,894,400
Actual Nickel Used (Basic)		2,436,000
Actual Nickel Purchased		4,330,400
Actual Nickel $$ Paid for Purchases	$	10,652,784
Actual Integrated Circuits Used (Advanced)		800,000
Actual Integrated Circuits Used (Basic)		280,000
Actual Integrated Circuits Purchased		1,305,000
Actual Integrated Circuits $$ Paid for Purchases	$	25,708,500

2: Direct Labor

Actual DL Hours from Electrical (Advanced)	323,200
Actual DL Hours from Electrical (Basic)	565,600
Actual DL Hours from Assembly (Advanced)	963,200
Actual DL Hours from Assembly (Basic)	616,000

3: Manufacturing Overhead

Actual Machine Hours from Electrical (Advanced)	960,000
Actual Machine Hours from Electrical (Basic)	277,200
Actual Machine Hours from Assembly (Advanced)	688,000
Actual Machine Hours from Assembly (Basic)	518,000

TABLE 4: INCOME SUMMARIES FOR FISCAL YEAR 2013

	Budget	Flexible	Actual
Advanced			
Revenues	$ 52,500,000	$ 56,000,000	$ 54,400,000
Direct Materials	$ 17,700,000	$ 18,880,000	$ 20,420,224
Direct Labor	$ 16,800,000	$ 17,920,000	$ 18,331,200
Applied Manufacturing Overhead	$ 14,250,000	$ 15,200,000	$ 16,315,200
Gross Margin - Advanced	$ 3,750,000	$ 4,000,000	$ (666,624)
Basic			
Revenues	$ 47,250,000	$ 37,800,000	$ 39,200,000
Direct Materials	$ 15,575,000	$ 12,460,000	$ 11,508,560
Direct Labor	$ 19,600,000	$ 15,680,000	$ 16,837,800
Applied Manufacturing Overhead	$ 9,975,000	$ 7,980,000	$ 7,872,480
Gross Margin - Basic	$ 2,100,000	$ 1,680,000	$ 2,981,160
Total Gross Margin	**$ 5,850,000**	**$ 5,680,000**	**$ 2,314,536**
Period Costs			
Commissions	$ 1,995,000	$ 1,876,000	$ 1,872,000
Salesperson Salaries	$ 450,000	$ 450,000	$ 425,000
Fixed Administrative Costs	$ 1,650,000	$ 1,650,000	$ 1,505,000
Interest	$ 520,000	$ 520,000	$ 630,000
Pre-Tax Income	**$ 1,235,000**	**$ 1,184,000**	**$ (2,117,464)**

TABLE 5: VARIANCES FOR FISCAL YEAR 2013

Advanced GM Sales Volume Variance	$ 250,000.00	F
Basic GM Sales Volume Variance	$ 420,000.00	U
Period Cost Sales Volume Variance	$ 119,000.00	F
Total Activity/Sales Volume Variance	$ 51,000.00	U
Advanced Revenue/Selling Price Variance	$ 1,600,000.00	U
Basic Revenue/Selling Price Variance	$ 1,400,000.00	F
Total Revenue/Selling Price Variance	$ 200,000.00	U
Nickel Quantity Variance	$ 274,000.00	F
Nickel Price Variance	$ 173,216.00	F
Total Nickel Variance	$ 447,216.00	F
Integrated Circuits Quantity Variance	$ 3,520,000.00	U
Integrated Circuits Price Variance	$ 3,001,500.00	F
Total Integrated Circuits Variance	$ 518,500.00	U
Electrical DL Efficiency Variance	$ 123,200.00	U
Assembly DL Efficiency Variance	$ 828,800.00	U
DL Price Variance	$ 617,000.00	U
Total DL Variance	$ 1,569,000.00	U
Electrical MOH Efficiency Variance	$ 26,600.00	F
Assembly MOH Efficiency Variance	$ 57,000.00	U
MOH Price Variance	$ 977,280.00	U
Total MOH Variance	$ 1,007,680.00	U
Commission Variance	$ 4,000.00	F
Salaries Fixed Cost Variance	$ 25,000.00	F
Fixed Administrative Cost Variance	$ 145,000.00	F
Interest Cost Variance	$ 110,000.00	U
Total Period Cost Variances	$ 64,000.00	F

TABLE 6: REGRESSION ANALYSIS OF FACTORY MOH COSTS ON POTENTIAL COST DRIVERS

Annual Electrical Components Department MOH Costs***

Cost Driver	Regression Results (for cost driver)	R^2
Machine Hours (Electrical Components)	Y = 2,800,000 + 13.00(X)	0.83
Direct Labor Hours (Electrical Components)	Y = 5,250,000 + 15.00(X)	0.55

Annual Assembly Department MOH Costs***

Cost Driver	Regression Results (for cost driver)	R^2
Machine Hours (Assembly)	Y = 2,100,000 + 2.50(X)	0.34
Direct Labor Hours (Assembly)	Y = 1,750,000 + 3.00(X)	0.91

***These regressions are based on annual data. The MOH costs include $1,250,000 of factory depreciation from the Electrical Components Department and $500,000 of factory depreciation from the Assembly Department. All other costs are paid in cash when incurred.

TABLE 7: STANDARD COST CARD FOR 2014 (SUGGESTED SOLUTION)

	Advanced Device	Basic Device
Direct Materials		
Ounces of Nickel per Unit	6.00	9.00
Cost per Ounce of Nickel	$2.46	$2.46
Number of Integrated Circuits per Unit	2.00	1.00
Cost per Integrated Circuit	$22.00	$22.00
Direct Labor		
DL Hours per Unit (Electrical Components)	1.0	2.0
DL Hours per Unit (Assembly)	3.0	2.2
Total DL Hours per Unit	4.0	4.2
Cost per DL Hour	$15.00	$15.00
Manufacturing Overhead		
Machine Hours per Unit (Electrical Components)	3.0	1.0
Machine Hours per Unit (Assembly)	2.0	2.0
Total Machine Hours per Unit	5.0	3.0
Variable Pre-Determined MOH Rate per Machine Hour (Electrical Components)	$13.00	$13.00
Variable Pre-Determined MOH Rate per Direct Labor Hour (Assembly)	$3.00	$3.00
Budgeted Fixed MOH (Electrical Components)	$2,800,000.00	
Budgeted Fixed MOH (Assembly)	$1,750,000.00	

TABLE 8: BUDGETED INCOME STATEMENT FOR 2014 (SUGGESTED SOLUTION)

Revenues – Advanced (Projected Sales = 350,000 units)	$66,500,000
Variable Costs - Advanced	
Direct Materials	$20,566,000
Direct Labor	$21,000,000
Applied Variable MOH	$15,750,000
Commissions	$1,330,000
Contribution Margin - Advanced	$7,854,000
Revenues – Basic (Projected Sales = 300,000 units)	$42,000,000
Variable Costs - Basic	
Direct Materials	$13,242,000
Direct Labor	$18,900,000
Applied Variable MOH	$5,700,000
Commissions	$840,000
Contribution Margin - Basic	$3,318,000
Total Contribution Margin	**$11,172,000**
Fixed Costs	
Fixed Overhead	$4,550,000
Fixed Salaries	$425,000
Fixed Administrative Costs	$1,650,000
Interest	$520,000
Pre-Tax Income	**$4,027,000**