

ACTIVITY-BASED COSTING AND THE MBA CORE MARKETING ADMINISTRATION COURSE: A CROSS-DISCIPLINARY CASE APPROACH

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ABSTRACT

Business school curricula often segregate disciplines until students are required to “bring it all together” in a single capstone course. However, integration of disciplines earlier in the educational experience increases student understanding of how firms function and meets the needs of businesses for employees with a broader view of the firm (e.g., Darian and Coppersmith 2001; Petty 2000). This paper addresses the cross-disciplinary approach of marketing and accounting. We propose a case that small schools with limited faculty may use to integrate activity-based costing into portions of the core MBA marketing course as a way for students to make better marketing decisions.

INTRODUCTION

As part of an ongoing effort to encourage business schools to examine appropriate areas for cross-disciplinary approaches to instruction, a recent AACSB task force on management education suggested that new curricula “blur boundaries between educational disciplines” (AACSB International 2002, p. 2). As Jan R. Williams, Dean of the University of Tennessee College of Business Administration points out, “No longer is it acceptable for students to learn subjects in isolation – accounting in accounting courses and marketing in marketing courses” (AACSB International 2003).

In response to AACSB accreditation standards and the demands of industry, many business schools are integrating versions of their core courses (Closs and Stank 1999; Pharr 2000; Pharr and Morris 1997). One business college even used a new product development process to revise its core curriculum and give emphasis to the integration of all business disciplines (Sautter et al. 2000). While the extent to which schools integrate their curricula varies, business schools need constantly to look for opportunities to enhance cross-disciplinary approaches (Ryan 1999).

Industry demands for students with critical thinking and teamwork skills also support the notion of cross-disciplinary instruction. Competitive advantage in the future will go to those firms whose employees are able to work beyond traditional disciplinary boundaries (AACSB 2002).

Implementing a cross-disciplinary approach is a challenging experience involving business school resources, attitudes of participating faculty, and a great deal of extra

effort (Pharr 2000; Sautter et al. 2000). The purpose of this paper is to present a case that allows accounting and marketing faculty in a small, part-time MBA program to work together to highlight the relationship between the two disciplines.

Recent research in marketing education has suggested integrating marketing and finance (DeConinck and Steiner 1999), marketing and operations management (Darian and Coppersmith 2001), and marketing and business law (Petty 2000). The timeliness and importance of this stream of research is illustrated by the concurrent reduction of departmental boundaries taking place in many companies along with the stress, often ad hoc, placed on cross-functional teams to guide projects through the firm (Darian and Coppersmith 2001; DeConinck and Steiner 1999). These are but a few of the attempts reported in the literature to utilize marketing courses to “de-compartmentalize” business curricula.

Consistent with these efforts, we propose that the concept of activity-based costing (ABC) be integrated into the MBA level marketing administration core course. An examination of the literature reveals that firms as diverse as manufacturing, insurance, financial services, social service organizations, and institutions of higher learning use activity-based costing as a tool in determining customer lifetime value (CLV) (e.g., Ness et al. 2001a; Ness et al. 2001b; Selden and Colvin 2002), the level of unused capacity (Cooper and Kaplan 1992), the effectiveness of different retail locations, channels, and salespeople (Kantor and Maital 1999; Krupnicki and Tyson 1997; Naughton-Travers 2001; Richardson 2000; Thurston, Deleman, and MacArthur 2000; Tatikonda and Tatikonda 2001), and customer satisfaction (Roper 1994).

Many of the uses of ABC involve traditional marketing functions. Therefore, managerial accounting students well versed in ABC generally appreciate the application of ABC to the marketing role of the firm. In turn, students whose concentration is more general need a knowledge and appreciation of the role of ABC as a tool for effective marketing administration.

Small MBA programs are often part-time, use more adjunct faculty than larger, full-time programs, and offer fewer electives beyond the core requirements. Therefore, cross-disciplinary approaches require both the creativity of and cooperation among faculty. This paper presents an argument for the inclusion of ABC in marketing courses. It also outlines the method our graduate school of business uses to integrate ABC into the marketing core of the MBA curriculum using a mini-case study. Although the case study is not intended to teach the reader all the fundamentals of an activity-based cost accounting system, the case solution documents all calculations in an easy to understand format.

WHY INCLUDE ABC IN THE CORE MBA MARKETING COURSE?

Marketing draws from and contributes to other business disciplines. Therefore, marketing is in a unique position to play an important role in an integrated program (Barber et al. 2001). Seventy-five percent or more of most core marketing courses include topics every instructor should cover. The balance of time, however, allows instructors to determine what other disciplines provide synergy for a better understanding of marketing principles. We argue that accounting is rich with possibilities.

A review of the current literature provides ample illustrations of the application of activity-based costing to all areas of the marketing mix. For example, Kantor and Maital (1999) used activity-based costing combined with data envelopment analysis to determine product-specific efficiency in commercial banks. Sievanen et al. (2004) examined the variation in the profitability of a product using ABC.

The use of ABC as a major element in the pricing decision has been reported in firms as diverse as the printing industry (Cross 2004) and the insurance industry (Thurston et al. 2000). Lere (2000) posited that ABC is an excellent tool to use in pricing products.

Channels of distribution and ABC are also addressed in the literature. Georgakopoulos and Mihiotis (2004) suggest ABC as one method of determining the efficiency of a distribution network in retailing. Richardson (2000) illustrates how ABC can be used to evaluate different members of the firm's supply chain.

In the area of promotion, Dickinson and Lere (2003) use activity-based costing to improve performance evaluation of salespeople. Silver (2003) also proposed ABC as a tool for salesperson performance evaluation with the

addition of data envelopment analysis. Bukovinsky et al. (2000) developed a hypothetical case employing ABC to determine sales costs.

Recently several MBA level textbooks have begun to introduce activity-based costing to marketing students (Ferrell et al. 2002; Kotler 2003). For example, Kotler (2003) notes "customer profitability analysis (CPA) is best conducted with the tools of an accounting technique called activity-based costing" (p. 82). Ferrell et al. (2002) point to the value of activity-based costing in identifying both hard and soft costs in building client relationships. According to Cravens and Piercy (2002), ABC is a vital part of product strategy including value chain analysis of suppliers, customers, and competitors.

LIMITATIONS OF TRADITIONAL COST ACCOUNTING AS A TOOL FOR MARKETING MANAGERS

Conventional cost determination is inadequate for marketing managers in at least three areas – determining the lifetime value of a customer (Cooper and Kaplan 1992), aggregating costs in pricing decisions (Naughton-Travers 2001), and salesperson performance evaluation (Dickinson and Lere 2003). A brief discussion of each follows.

Customer Lifetime Value

Appropriate calculation of customer lifetime value is important because big customers (in terms of absolute revenue) are not always the best customers (McKenna 1988). Customer lifetime value is "a performance measurement of long-term customer worth" (Ness et al. 2001a, p. 32).

A common method used to measure CLV involves computation of the net present value of the revenue stream from a customer (Sawhney 2003). This approach assumes that revenue should be the sole determinant of customer value. Revenue can be misleading, however, because some customers cost the firm more than others. Therefore, companies need more information than revenue to measure CLV. First, the company should determine the customer's contribution margin (revenue less variable costs) for the products purchased. Assuming customer A and B purchase the same dollar amount of goods and services, all other things equal, customer A is clearly more valuable if its purchases consist of higher margin products or services. Generally, all other considerations are not equal for different customers. Therefore, the customer's consumption of indirect or overhead resources should also be evaluated (Ness et al. 2001a). As a customer consumes additional company resources, net customer gross margins (revenue less cost of goods sold) decline and can even become unprofitable. This is particularly true when a customer only purchases products with narrow contribu-

tion margins as there is little room to provide indirect resources to that customer and still earn a profit. Some customers consume resources through high maintenance activities that might be overlooked when determining CLV. These include a customer's reluctance to place orders electronically, placing multiple smaller orders, demanding additional training and attention to ensure customer loyalty, and habitual payment tardiness (Ness et al. 2001a). Therefore, important costs associated with each customer must be calculated to determine whether a customer increases the seller's profitability (Selden and Colvin 2002).

In contrast, when activity-based costing is used as a CLV measurement tool, customer costs and revenues are simultaneously considered. Thus, activity-based costing is a valuable tool in differentiating customers according to their contribution to profit (Desarbo et al. 2001; Ness et al. 2001a; Ness et al. 2001b). Armed with CLV measurements provided by an ABC system, marketing managers are in a position to segment customers according to their value. Managers are better able to explain to customers the relationship of the value received for the price paid. For example, if a customer provides substantial revenue, but at the same time uses a disproportionate level of resources, it may be necessary to change that customer's pricing structure. The information may also be used to develop pricing systems that unbundle products and services that support those products. This information can be given to salespeople to use in development of customers. Finally, information about customer value can be employed to increase efficiency by reducing unused resources that provide support services (Ness et al. 2001a; Zeller et al. 2001).

ABC and Aggregating Costs

Next, we will address the problem of aggregating costs. Conventional methods of teaching price in a marketing administration course direct students to calculate the total cost of a unit of product by adding variable and fixed costs. Fixed costs per unit are determined by dividing the number of units produced into total fixed costs. Although this method allows the marketer to benchmark the firm's price with competitors, it is not necessarily an accurate measure of the true cost to the firm of producing the product. The assumption of this approach is that costs vary only with output volume. ABC, on the other hand, recognizes that costs vary with activities such as the number of shipments. More importantly, different products, services, and customers require different amounts of activities and therefore generate different levels of costs.

When analyzed from an ABC perspective, it is possible to see variance in volume does not always result in a consistent variance in unit cost. For example, when companies produce a diverse product line, use of a traditional, volume-based costing system can easily lead to product cost distortions. This occurs when different products

consume different amounts of activities (Hilton 1999). A common outcome is over-costing of low complexity products and under-costing of high complexity products. In contrast, ABC allows marketing managers to ascribe a more accurate cost to diverse products resulting in a more realistic pricing process (Lere 2000). Because managers no longer guess about the apportionment of fixed costs, ABC is particularly effective for firms that produce a variety of products or services (Naughton-Travers 2001; Tatikonda and Tatikonda 2001). Further, from a marketing management perspective, managers can determine if a product is over/under-priced, add/eliminate profitable/unprofitable products, and increase long-term ROI.

ABC and Salesperson Performance Evaluation

Conventional performance evaluation for salespeople assumes costs vary only on the basis of output volume (Futrell 2001). While revenues and gross profit associated with a salesperson and customer are easily obtained from a traditional cost accounting system, more subtle, yet important costs may only be available from an ABC cost accounting system. These costs include those associated with training of customer employees, restocking returned goods, number of orders placed, face time spent with the customer to ensure loyalty, and any necessary collection activities for customer delinquent accounts receivable (Dickinson and Lere 2003). ABC can be used to track and accurately assign all of these costs to individual salespeople. This additional cost detail more accurately illustrates the true profitability of a salesperson's clients and is therefore a better salesperson evaluation tool. However, it is incumbent on the marketing manager to understand the limitations of a traditional cost accounting system and to request the additional detail that can be obtained from an ABC cost accounting system. Knowledge of these costs can also improve the terms negotiated by sales representatives and lead to increased profitability because of their understanding of how these factors affect cost incurrence. An ABC cost accounting system, therefore, quantifies why revenue generation should not be the sole measure of marketing effectiveness.

IMPLEMENTATION OF ABC INTO THE MARKETING ADMINISTRATION COURSE

Five key steps are necessary to integrate activity-based costing into the core MBA marketing administration course: planning, learning, collaboration, implementation, and evaluation.

The first step is for marketing professors to plan to introduce the concept of ABC at some point in the marketing administration course. As previously noted, opportunities include lessons on pricing, customer lifetime value, or sales management.

Second, marketing instructors need to understand the

basics of ABC. Many reference sources provide easy-to-understand examples of ABC applied in a marketing context. Dickinson and Lere (2003), for example, define ABC terminology and discuss ABC in the context of evaluation of sales representative performance. In addition, most managerial and cost accounting textbooks explain ABC and discuss the need for ABC systems. For example, Weygandt et al. (2005, p. 154) state that production and marketing managers must sometimes ignore data from a traditional cost accounting system when making pricing or other decisions because of their awareness that the traditional system is inadequate for a company's products and services. Additionally, accounting faculty serve as a resource to clarify issues or to participate in team teaching of these concepts.

In step three, marketing and accounting faculty collaborate to determine the best pedagogical method for presenting the material. Various options are available. The simplest is to use an example comparing ABC and traditional cost accounting. The mini-case provided in this paper provides detailed, yet easy to follow calculations contrasting a traditional cost accounting system to an ABC system. Other methods include scenarios or comprehensive cases. The approach chosen will be determined by the method used to teach the course and students' overall ability.

Implementation of the chosen teaching method completes step four. Faculty may wish to consider "trading off" lessons. That is, an accounting professor teaches the marketing class ABC while the marketing instructor addresses the accounting class on marketing professional services.

Finally, instructors need to evaluate the effectiveness of the chosen pedagogy. Assessment instruments may include pre- and post-tests, class discussion of what was learned, and/or comments on student course evaluations. While we have not used a separate instrument to evaluate our program, comments from students are positive. This includes informal comments during the semester as well as written comments that are part of the instructor's formal evaluation. Specifically, several students stated they appreciated the "real world" application a cross-disciplinary approach offers.

INTEGRATING THE ABC CASE INTO THE MBA MARKETING COURSE

While comprehensive cases such as Dakota Office Products (Kaplan 2002) exist, our faculty generally do not use the comprehensive case method in our MBA program. Therefore, we chose to write a mini-case that clearly demonstrates the difference between ABC and traditional cost accounting in a manufacturing pricing situation. The case specifically addresses product pricing, profitability, and production and sales mix.

A Comparison of Traditional Cost Approaches to Pricing and ABC

Traditional approaches to pricing in marketing texts involve cost-based pricing, value-based pricing, and competition-based pricing (e.g., Armstrong and Kotler 2003). Emphasis, from a quantitative perspective, is often on cost-based pricing (e.g., Berkowitz et al. 2000). This approach posits that the total cost to manufacture a product is the sum of the firm's fixed and variable costs related to that product. Variable costs are all costs that change directly and proportionately (in total) to a change in the level of activity (a measure of the organization's output) (Hilton 1999, p. 30). Since variable costs are easily associated with the production of a specific product or service, allocation of these costs is not difficult and generally non-controversial. Fixed costs, however, can present unique product cost allocation challenges. Unlike variable costs, within a relevant range, total fixed costs do not change as a result of changes in the level of output volume or activity. Of course, a substantial increase in activity could necessitate a plant expansion and therefore increase total fixed costs.

However, the most significant components of manufacturing overhead are fixed costs such as depreciation on the factory and machinery, factory utility costs, service department costs, and quality control. Historically, fixed costs have been allocated as a bundle to particular products on the basis of production volume. This method is inherently limited since costs are allocated to products without regard to causality. More complex products may require higher levels of manufacturing support resulting in the incurrence of disproportionate manufacturing overhead costs. Rather than allocate costs based on volume, ABC allocates costs to products on the basis of variance in *activities* caused by the production of products or services. Cooper and Kaplan (1991) state that with ABC "costs are not intrinsically fixed or variable" (p. 135).

ABC allocates costs to products or services on the basis of what caused the costs to be incurred.

Basically, ABC follows a two-step process. First, overhead costs are assigned to different activities that cause costs to be incurred (cost drivers). Second, "overhead costs are allocated from each activity cost pool to each product line in proportion to the amount of the cost driver consumed by the product line" (Hilton 1999, p. 160). Therefore, costs vary and are allocated to products in response to changes in activities rather than to changes in product output volume.

Accurate product costing is essential to the pricing function of marketing. Since pricing is frequently a function of product cost, pricing is dependent on the cost accounting system. Of course, pricing is also affected by many other factors such as consumer demand and competitive forces. However, in all instances, product cost is important and usually is considered the floor for pricing decisions.

Cost accounting systems classify all manufacturing costs in one of three categories: direct material, direct labor, or manufacturing overhead. Direct material costs (raw materials used in manufacturing) and direct labor costs (personnel that directly work on the production of the product) are easily traced to a product because these costs vary directly and proportionately with changes in production output volume. Consequently, direct costs can be attributed to products with relatively simple cost accounting systems. The third component, manufacturing overhead, can create significant cost allocation challenges because these costs are indirect. Indirect costs by nature are not easily traced to a product or service because of the difficulty in establishing a clear cause and effect relationship between the cost and the product or service. As a result, indirect costs are sometimes referred to as common costs. These essential costs include indirect materials (e.g., screws, glue), indirect labor (e.g., material handlers, factory supervisors), factory utility costs, and fixed production costs such as depreciation on the factory and machinery. Since total manufacturing overhead costs do not vary directly and proportionately with changes in production output volume, these costs are more difficult to trace to products.

Manufacturing overhead costs have traditionally been bundled together and allocated to products in a lump sum on the basis of production volume. In contrast, ABC allocates manufacturing overhead on the basis of multiple activities incurred as a result of the production of products or services.

We assign the following illustrative case to students in our core marketing MBA class. The case contrasts traditional volume-based overhead cost allocation with ABC. The case is relatively easy for students to understand yet greatly enhances their comprehension of the pricing function as well as the advantages of using ABC to determine a more accurate product cost. The case centers on a manufacturer that produces two technologically diverse products. We foster a healthy classroom discussion by separating the class into two groups. One group is asked to role-play as marketing manager for one product while the other group analyzes the case from the perspective of serving as the marketing manager for the other product. After assignment of the case for homework, we devote anywhere from about one to two hours of classroom time to discuss the case solution. The amount of time committed to the mini-case depends on the extent of student role-play.

HORIZON VIDEO CASE

Case Scenario

Five years ago CEO Jay Green founded Horizon Video to produce an upper-end DVD player known as the Saturn. Two years ago Horizon secured contracts to

supply its Saturn DVD players to MegaVideo, a major electronics superstore with nationwide retail outlets. The units have sold well with a wholesale price of \$380. The Saturn has also proven to be very reliable with an average failure rate during the warranty period of .001 percent.

As a result of this success, last year Horizon decided to enter the higher end of the home entertainment market and began producing a second product – a state of the art DVD player/recorder with a product name of Jupiter. Jupiter is versatile since it can record audio and video on an internal hard drive or it can be recorded more permanently on DVDs. MegaVideo immediately added Jupiter to its product line purchasing the product from Horizon at a wholesale price of \$700. Sales of Jupiter have far exceeded Horizon's expectations. MegaVideo's marketing director, John Sellers, recently met with Jay Green to encourage increased production of the Jupiter model to meet present and expected future sales potentials. Sellers explained his excitement about Jupiter as it has emerged as MegaVideo's most popular product in this category. Sellers attributed this accomplishment to Jupiter's outstanding quality, versatile features, and relatively low price in comparison to competitor products.

After talking with John Sellers, Green met with Horizon's marketing VP, Janet Gateway, and Horizon's controller, Bill Quick. Green wanted to gain more insights before deciding whether or not to step up production of Jupiter. Gateway explained that although last year's sales of Saturn were much higher than those of Jupiter, she believes that the company's future success depends on Jupiter. Gateway's assessment was based on the rapid growth of home theatre sales and consumers' desires for state of the art electronics. She also noted that the product life cycle of Saturn is rapidly reaching maturity. Bill Quick prepared a cost and profitability analysis of the company's two models, Saturn and Jupiter. Quick delivered Table 1, an Income Statement for Horizon's most recent year of operation, as well as Table 2, production cost data for the Saturn and Jupiter models. Table 2 was prepared using Horizon's traditional cost accounting system.

After hearing Gateway's views and reviewing the production cost and profitability analysis prepared by Quick, Green announced that Horizon should concentrate on the production and sale of the Jupiter model and should begin phasing out the Saturn model. Green thought the data clearly supported this move since the Jupiter model contributed more than twice as much net income per unit sold as did the Saturn model (see Table 1). In spite of this, Bill Quick voiced some concerns that additional analysis may be required before finalizing Green's decision. Quick convinced Green to defer his decision until Quick could perform an activity-based costing analysis of Horizon's manufacturing overhead costs. Quick recently attended a continuing professional education course that explained the merits of implementing an activity-based costing

TABLE 1
HORIZON VIDEO
INCOME STATEMENT
BASED ON TRADITIONAL COST ACCOUNTING SYSTEM
FOR THE YEAR ENDED DECEMBER 31, 2004

	Saturn	Jupiter	Total
Sales	\$9,500,000 ⁽¹⁾	\$3,150,000 ⁽³⁾	\$12,650,000
Cost of Goods Sold	\$6,900,000 ⁽²⁾	\$2,052,000 ⁽⁴⁾	\$8,952,000
Gross Profit Margin	\$2,600,000	\$1,098,000	\$3,698,000
Selling & Administrative Expense	\$1,400,000	\$600,000	\$2,000,000
Net Income	\$1,200,000	\$498,000	\$1,698,000
Units Produced & Sold	25,000	4,500	
Net Income per Unit Sold	\$48.00	\$110.67	

Calculations:

⁽¹⁾ 25,000 X \$380 = \$9,500,000

⁽²⁾ 25,000 X \$276 = \$6,900,000

⁽³⁾ 4,500 X \$700 = \$3,150,000

⁽⁴⁾ 4,500 X \$456 = \$2,052,000

TABLE 2
HORIZON VIDEO
PRODUCTION COSTS
BASED ON TRADITIONAL COST ACCOUNTING SYSTEM
FOR THE YEAR ENDED DECEMBER 31, 2004

	Saturn	Jupiter
Direct Material	\$65	\$305
Direct Labor:		
Saturn (1.5 hr. @ \$14)		
Jupiter (4 hr. @ \$14)	\$21	\$56
Manufacturing Overhead		
Applied at \$38 per Machine Hour:		
Saturn (5 hr.)		
Jupiter (2.5 hr.)	\$190	\$95
Standard Total Production Cost per Unit	\$276	\$456

system. The seminar presenters impressed on Quick that ABC is especially useful to companies that produce products with varying levels of complexity.

An ABC cost accounting system is similar to a traditional cost accounting system in that all manufacturing costs are classified as direct material, direct labor, or manufacturing overhead. Of course, direct material and direct labor costs would be the same in either a traditional cost accounting system or an ABC cost accounting system. ABC is unique, however, in its ability to fine tune the allocation of manufacturing overhead costs through an identification and analysis of cause and effect relationships. After consultation with engineering, manufacturing, quality control, purchasing and shipping personnel, Quick prepared an analysis of Horizon's manufacturing overhead activities and cost drivers that led to the incur-

rence of these costs. Table 3 presents Quick's analysis that separates manufacturing overhead costs into six categories. Included in Table 3 is his development of overhead rates based on cost drivers for each of these cost categories. These rates can be used to more accurately allocate manufacturing overhead costs to the Saturn and Jupiter models. As such, Table 3 provides the foundation for analyzing Horizon's performance for the year ended December 31, 2004 in an ABC context.

Note that total manufacturing overhead costs of \$5,177,500, as presented in Table 3, are consistent with the total manufacturing overhead cost data provided in Table 2:

Saturn manufacturing overhead costs =
 $\$190 \times 25,000 \text{ units} = \$4,750,000$
 Jupiter manufacturing overhead costs =

TABLE 3 HORIZON VIDEO MANUFACTURING OVERHEAD ACTIVITIES AND COST DRIVERS COMPILED FOR ABC SYSTEM BASED ON PRODUCTION COSTS AND VOLUME FOR YEAR ENDED DECEMBER 31, 2004					
Number of Cost Driver Events					
Activity (Cost Driver)	Overhead Costs	Saturn	Jupiter	Total	Rate per Cost Driver
Soldering (# of solders)	\$600,000	890,000	310,000	1,200,000	\$0.50 per solder ⁽¹⁾
Shipments (# of shipments)	\$390,000	12,100	2,900	15,000	\$26 per shipment ⁽²⁾
Quality Control (# of Inspections)	\$640,000	46,500	17,500	64,000	\$10 per inspection ⁽³⁾
Purchase Orders (# of orders)	\$442,000	72,000	98,000	170,000	\$2.60 per order ⁽⁴⁾
Machine Usage (machine hours)	\$2,460,500	158,175	17,575	175,750	\$14 per hour ⁽⁵⁾
Machine setups (# of setups)	\$645,000	17,150	15,100	32,250	\$20 per setup ⁽⁶⁾
Total Overhead Costs	\$5,177,500				
Calculations: ⁽¹⁾ $\$600,000/1,200,000 = \0.50 ⁽²⁾ $\$390,000/15,000 = \26.00 ⁽³⁾ $\$640,000/64,000 = \10.00 ⁽⁴⁾ $\$442,000/170,000 = \2.60 ⁽⁵⁾ $\$2,460,500/175,750 = \14.00 ⁽⁶⁾ $\$645,000/32,250 = \20.00					

TABLE 4 (REQUIREMENT # 1)
INCOME STATEMENT
BASED ON ABC COST ACCOUNTING SYSTEM
FOR THE YEAR ENDED DECEMBER 31, 2004

	Saturn	Jupiter	Total
Sales	\$9,500,000 ⁽¹⁾	\$3,150,000 ⁽²⁾	\$12,650,000
Cost of Goods Sold (see Table 5)	\$6,119,250	\$2,832,750	\$8,952,000
Gross Profit Margin	\$3,380,750	\$317,250	\$3,698,000
Selling & Administrative Expense	\$1,400,000	\$600,000	\$2,000,000
Net Income (Loss)	\$1,980,750	(\$282,750)	\$1,698,000
Units Sold	25,000	4,500	
Per Unit Calculations:			
Sales Price	\$380.00	\$700.00	
Less Cost of Goods Sold	\$244.77	\$629.50	
Gross Profit Margin	\$135.23	\$70.50	
Gross Profit Margin Percentage	35.6%	10.1%	
Net Income (Loss) per Unit Sold	\$79.23	(\$62.83)	
Calculations: ⁽¹⁾ 25,000 X \$380 = \$9,500,000 ⁽²⁾ 4,500 X \$700 = \$3,150,000			

\$95 X 4,500 units = \$427,500
Total manufacturing overhead costs = \$5,177,500

This relationship holds because the accounting system does not change the actual incurrence of costs. Instead, ABC fine tunes the allocation of total overhead costs to individual products and services.

Required Student Analysis

1. Prepare an Income Statement for Horizon for the year ended December 31, 2004 similar to Table 1 yet based on the ABC manufacturing overhead cost data. As a hint, first prepare a separate schedule of cost of goods sold (direct material, direct labor, and manufacturing overhead) for Saturn and Jupiter. Direct material and direct labor per unit costs are provided in Table 2. Manufacturing overhead costs are assigned to the two products using the ABC "rate per cost driver" data provided in Table 3.
2. Comment on the appropriateness of Horizon's pricing structure for Saturn and Jupiter.
3. Discuss whether Horizon should phase out the Saturn model and focus exclusively on production of the Jupiter model.

4. Assume that Horizon decides to exclusively produce and sell the Jupiter model in 2005. Prepare a *pro forma* (as if) Income Statement for Horizon for the year ended December 31, 2005 assuming:
 - a. wholesale price of Jupiter remains \$700 per unit,
 - b. direct material and direct labor costs remain \$305 and \$56, respectively,
 - c. manufacturing overhead cost structure per unit of cost driver remains the same as supplied in Table 3,
 - d. total company selling and administrative expense remains \$2,000,000,
 - e. production and sales volume for Jupiter doubles to 9,000 units.

HORIZON VIDEO CASE STUDY **TEACHING NOTE**

Requirement #1

ABC analysis demonstrates that Horizon's traditional cost accounting system under-costed the Jupiter model while over-costing the Saturn model. This occurred because Saturn's more mature technology required less expensive manufacturing overhead activities than Jupiter.

TABLE 5 (REQUIREMENT # 1)
HORIZON VIDEO
COSTS OF GOODS SOLD PER MODEL
BASED ON ABC ACCOUNTING SYSTEM
FOR YEAR ENDED DECEMBER 31, 2004

	Saturn	Jupiter
Direct Material	\$1,625,000 ⁽¹⁾	\$1,372,500 ⁽⁹⁾
Direct Labor	\$525,000 ⁽²⁾	\$252,000 ⁽¹⁰⁾
Total Direct Costs	\$2,150,000	\$1,624,500
Manufacturing Overhead Costs Assigned via ABC:		
Soldering	\$445,000 ⁽³⁾	\$155,000 ⁽¹¹⁾
Shipments	\$314,600 ⁽⁴⁾	\$75,400 ⁽¹²⁾
Quality Control	\$465,000 ⁽⁵⁾	\$175,000 ⁽¹³⁾
Purchase Orders	\$187,200 ⁽⁶⁾	\$254,800 ⁽¹⁴⁾
Machine Usage	\$2,214,450 ⁽⁷⁾	\$246,050 ⁽¹⁵⁾
Machine Setups	\$343,000 ⁽⁸⁾	\$302,000 ⁽¹⁶⁾
Total Assigned Overhead Costs	\$3,969,250	\$1,208,250
Total Cost of Goods Sold (Direct Costs + Assigned Overhead Costs)	\$6,119,250	\$2,832,750
Calculations:		
⁽¹⁾ 25,000 X \$65 = \$1,625,000	⁽⁹⁾ 4,500 X \$305 = \$1,372,500	
⁽²⁾ 25,000 X \$21 = \$525,000	⁽¹⁰⁾ 4,500 X \$56 = \$252,000	
⁽³⁾ 890,000 X \$.50 = \$445,000	⁽¹¹⁾ 310,000 X \$.50 = \$155,000	
⁽⁴⁾ 12,100 X \$26 = \$314,600	⁽¹²⁾ 2,900 X \$26 = \$75,400	
⁽⁵⁾ 46,500 X \$10 = \$465,000	⁽¹³⁾ 17,500 X \$10 = \$175,000	
⁽⁶⁾ 72,000 X \$2.60 = \$187,200	⁽¹⁴⁾ 98,000 X \$2.60 = \$254,800	
⁽⁷⁾ 158,175 X \$14 = \$2,214,450	⁽¹⁵⁾ 17,575 X \$14 = \$246,050	
⁽⁸⁾ 17,150 X \$20 = \$343,000	⁽¹⁶⁾ 15,100 X \$20 = \$302,000	

TABLE 6 (REQUIREMENT #4)
PRO FORMA INCOME STATEMENT
EXCLUSIVE PRODUCTION AND SALE OF JUPITER MODEL
BASED ON ABC COST ACCOUNTING SYSTEM
FOR THE YEAR ENDED DECEMBER 31, 2005

	Jupiter
Sales	\$6,300,000 ⁽¹⁾
Cost of Goods Sold (see Table 7)	\$5,665,500
Gross Profit Margin	\$634,500
Selling & Administrative Expense	\$2,000,000
Net Income (Loss)	(\$1,365,000)
Units Sold	9,000
Per Unit Calculations:	
Sales Price	\$700.00
Less Cost of Goods Sold	\$629.50
Gross Profit Margin	\$70.50
Gross Profit Margin Percentage	10.1%
Net Income (Loss) per Unit Sold	(\$151.66)
Calculation:	
⁽¹⁾ 9,000 X \$700 = \$6,300,000	

TABLE 7 (REQUIREMENT #4)
HORIZON VIDEO
PRO FORMA COSTS OF GOODS SOLD PER MODEL
BASED ON ABC ACCOUNTING SYSTEM
FOR YEAR ENDED DECEMBER 31, 2004

	Jupiter
Direct Material	\$2,745,000 ⁽¹⁾
Direct Labor	\$504,000 ⁽²⁾
Total Direct Costs	\$3,249,000
Manufacturing Overhead Costs Assigned via ABC:	
Soldering	\$310,000 ⁽³⁾
Shipments	\$150,800 ⁽⁴⁾
Quality Control	\$350,000 ⁽⁵⁾
Purchase Orders	\$509,600 ⁽⁶⁾
Machine Usage	\$492,100 ⁽⁷⁾
Machine Setups	\$604,000 ⁽⁸⁾
Total Assigned Overhead Costs	\$2,416,500
Total Cost of Goods Sold (Direct Costs + Assigned Overhead Costs)	\$5,665,500
Calculations:	
⁽¹⁾ 9,000 X \$305 = \$2,745,000	
⁽²⁾ 9,000 X \$56 = \$504,000	
⁽³⁾ 620,000 X \$.50 = \$310,000	
⁽⁴⁾ 5,800 X \$26 = \$150,800	
⁽⁵⁾ 35,000 X \$10 = \$350,000	
⁽⁶⁾ 196,000 X \$2.60 = \$509,600	
⁽⁷⁾ 35,150 X \$14 = \$492,100	
⁽⁸⁾ 30,200 X \$20 = \$604,000	

ter's sophisticated state of the art technological features. Horizon earns a much higher return on Saturn with a gross profit margin of over 35 percent while Jupiter generated only a 10 percent gross profit margin (see Table 4). After considering selling and administrative expenses, sale of the Jupiter model resulted in a net loss of about \$63 per unit while the Saturn model earned about \$79 per unit of net income. This result sharply contrasts with the Income Statement prepared on the basis of Horizon's traditional cost accounting system. As reported in Table 1, Jupiter's net income per unit is more than twice as high as Saturn's under the traditional cost accounting system.

Requirement #2

ABC data indicate that Jupiter has been greatly under-costed by Horizon's traditional cost accounting sys-

tem. ABC costing indicates the Jupiter has a cost of goods sold of \$629.50 (Table 4) versus only \$456 (Table 2) when computed using the traditional cost accounting system. At \$700, the Jupiter appears greatly under-priced when compared to a cost of \$629.50. This helps to explain why MegaVideo's VP of marketing is so anxious for Horizon to increase production of Jupiter and why Jupiter's competitor products are higher priced. In contrast, the traditional cost accounting system has over-costed the Saturn unit by more than 12 percent (\$244.77 ABC cost versus \$276 under the traditional cost system).

Requirement #3

Saturn is a much more profitable product than Jupiter at the current pricing structure. Unless the competitive environment permits Horizon to substantially increase the

price of Jupiter, Horizon should not phase out the Saturn model. With a gross profit margin of only \$70.50 per unit (Table 4), the Jupiter cannot easily cover its \$600,000 of allocated selling and administrative costs of the company. In fact, if the selling and administrative costs remain fixed at \$600,000, the company would have to sell 8,511 units to breakeven on Jupiter at the current sales price of \$700 per unit:

$$\begin{aligned}\text{Breakeven} &= \text{Total Fixed Costs/Unit Contribution} \\ &\text{Margin} \\ &= \$600,000/\$70.50 = 8,511 \text{ units (rounded)}\end{aligned}$$

Requirement #4

In spite of a projected doubling of the number of Jupiter units produced and sold, if Horizon decides to exclusively produce and sell the Jupiter model in 2005, the earnings of the company would substantially decrease unless Horizon is able to increase Jupiter's sales price. As indicated in the *pro forma* Income Statement (see Ta-

ble 6), company net losses are forecast at \$1,365,000, or a net loss of \$151.66 per Jupiter unit sold.

CONCLUSION

As businesses require MBA graduates to think of the firm in a more holistic manner than they have in the past, it is incumbent upon educators to increase the appreciation students have for disciplines other than their own. We propose in this paper that the integration of activity-based costing into the MBA core marketing course will aid in achieving this goal. Activity-based costing is an analysis tool that is used to evaluate pricing, channels, customer service, and customer lifetime value in a wide range of profit and not-for-profit firms.

Our approach is simple. Marketing faculty should familiarize themselves with the fundamentals of ABC, work with accounting faculty to develop illustrations and assessment tools (such as our mini-case), and lead students to a greater understanding of the modern firm.

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