The Quest for Marketing Effectiveness & ROI
with The Efficiency Analysis Package

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ABSTRACT

The Web-based Efficiency Analysis Package is a user-centered learning tool that provides participant teams the opportunity to assess the underlying reasons for any decrease in the sales-to-advertising ratio for each strategic business unit (SBU) within their SBU portfolio during each decision period, and thereby enhance their marketing effectiveness and efficiency. They assess the underlying reasons for any decrease in the sales-to-advertising ratio for each strategic business unit (SBU) within their SBU portfolio during each decision period. This marketing decision support package facilitates marketing efficiency analysis at both the company and SBU levels. At the company level, it (a) extracts company sales revenue and advertising by region, and (b) calculates the sales-to-advertising ratio for all competing teams. At the SBU level, it extracts the price, unit sales, advertising budget, advertising awareness index, and other elements of the marketing mix such as regional sales force size, company-wide salary and commission, and product quality indices from the simulation results. Competing participant teams use this package to exercise marketing control. They set sales-to-advertising ratio goals, monitor performance, identify deviations, understand the underlying reasons, take corrective action and thereby exercise marketing control.

INTRODUCTION

The Efficiency Analysis Package is a decision support system that enables competing participant teams in the marketing simulation COMPETE (Faria, 1994, 2006) to learn, identify and assess the underlying reasons for any decrease in the sales-to-advertising ratio within their SBU portfolio during each decision period. This Excel-based Efficiency Analysis Package automatically extracts relevant data on sales and its antecedents (elements of the marketing mix) via external links from the Excel-version of the COMPETE simulation results. Only relevant data on the antecedents of sales and advertising are extracted from the simulation results. This decision support package saves substantial time needed to identify and enter the relevant data and reduces the potential for data entry error.

Marketing simulation models can improve relevance and realism as they reflect emerging trends in the marketing arena such as (a) both online and offline advertising/marketing, (b) use of social media, (c) customer relationship management, and (d) customer-centric measures of performance such as customer loyalty, customer lifetime value, customer equity, and marketing ROI. Meanwhile, simulation performance measures are limited by the endogenous decision variables and simulation output measures generated by the simulation model. In the quest for a marketing ROI measure of simulation performance, the Efficiency Analysis Package is a decision support system that enables competing participant teams in the marketing simulation COMPETE (Faria et al., 1994; Faria 2006) to learn, identify and assess the underlying reasons for any decrease in the sales-to-advertising ratio within their SBU portfolio during each decision period.

DECISION SUPPORT SYSTEMS

Several scholars have commented on the value of including decision support software/systems in computer simulations (Keys and Biggs, 1990; Teach, 1990; Gold and Pray, 1990; Wolfe and Gregg, 1989). In addition, the literature is replete with references to the use and impact of decision support systems with computer simulations (Affisco and Chanin, 1989, 1990; Burns and Bush, 1991; Cannon et al., 1993; Fritzsche et al., 1987; Grove et al., 1986; Halpin, 2006; Honaiser and Sauaia, 2006; Markulis and Strang, 1985; Mitri et al., 1998; Muhs and Callen, 1984; Nulsen et al., 1993, 1994; Palia, 1989, 1991, 2006, 2009; Peach, 1996; Schellenberger, 1983; Shane and Bailes, 1986; Sherrell et al., 1986; Wingender and Wurster, 1987; Woodruff, 1992).

Decision support systems (DSSs) are defined as …a collection of data, systems, tools, and techniques with supporting software and hardware by which an organization gathers and interprets relevant information from business and environment and turns it into a basis for…action (Little, 1979; Burns and Bush, 1991). In addition, they are defined as computer-based information systems that support the process of structuring problems, evaluating alternatives, and selecting actions for more effective management (Forgionne, 1988). Further, they are described as the hardware and software that permit decision-makers to deal with a specific set of related problems by providing tools that amplify a manager's judgment (Sprague, 1980).

DSSs used with business simulations yield several benefits. These include greater depth of understanding of simulation activity with resulting increase in planning (Keys et al., 1986), in-depth understanding of quantitative techniques as students visualize the results of their applications, sensitivity to weaknesses in techniques used, and experience in capitalizing on their strengths (Fritzsche et al., 1987). Other benefits include minimization of paperwork and errors, error-free graphical representation of

output, a competitive tool with increasing value as simulation progresses, and potential for participants to create their own DSSs (Burns and Bush, 1991). In addition, DSSs enhance understanding of complex business relationships and provide additional value over time (Halpin, 2006). Further, DSSs provide realism, relevance, literacy, flexibility and opportunity for refinement (Sherrell et al., 1986).

Some authors contend that combining an active student generated database in the form of a simulation game with a DSS will result in improved decision making, lead to improved pro-active rather than re-active strategic planning, and result in improved simulation game performance and enhanced learning (Muhs and Callen, 1984). Others have reported no support for the premise that DSS usage improves small group decision making effectiveness (Affisco and Chanin, 1989), and that DSS usage to support manufacturing function decisions resulted in decreased manufacturing costs and increased "earnings/cost of goods sold" ratio in the second year of play (Affisco and Chanin, 1990).

Given the inconsistent findings with regard to the efficacy of DSSs reported in the literature, does DSS usage increase decision effectiveness and/or enhance learning? One scholar notes that while the DSS assists the decision maker, it does not make decisions, nor can it substitute for intelligent analysis and synthesis (Schellenberger, 1983). In addition, as with other computer-based or experiential learning techniques, the effectiveness of DSSs or the decisions made are less important than the insights they generate. The level of insight generated depends heavily on the clear explanation of the purpose, significance, assumptions, usage, and limitations of the DSS and underlying concepts applied, by the instructor. In addition, the level of insight generated depends heavily on the debriefing process used by the instructor to crystallize student learning (Cannon et al., 1993).

SIMULATION PERFORMANCE & EFFICIENCY ANALYSIS

Several authors have investigated the relationship between game performance and use of DSSs (Keys & Wolfe, 1990) as

EXHIBIT 1
EFFICIENCY ANALYSIS WORKSHEET

Efficiency - Sales-to-Advertising Ratio							
			TriniTech Company 2 Period 6				
	Company 1	Company 2	Company 3	Company 4	Company 5		
Sales Revenue	$39,000,000.00	$40,100,000.00	$35,200,000.00	$39,000,000.00	$37,000,000.00		
Advertising Reg 1	$ 910,000.00	$ 870,000.00	$ 600,000.00	$ 670,000.00	$ 800,000.00		
Advertising Reg 2	$ 870,000.00	$ 810,000.00	$ 630,000.00	$ 640,000.00	$ 450,000.00		
Advertising Reg 3	$ 890,000.00	$ 850,000.00	$ 550,000.00	$ 650,000.00	$ 750,000.00		
Total Advertising	$ 2,670,000.00	$ 2,530,000.00	$ 1,780,000.00	$ 1,960,000.00	$ 2,000,000.00		
Sales-to-Adv. Ratio	14.61	15.85	19.78	19.90	18.50		
						NAEM	Our
	Company 1	Company 2	Company 3	Company 4	Company 5	Indy. Avg.	Company
Price							
TST-1	$ 4,500	$ 4,530	$ 4,600	$ 4,500	$ 4,500	$ 4,526	
TST-2	$ 4,200	$ 4,370	$ 4,390	$ 4,350	$ 4,280	$ 4,318	
TST-3	$ 4,550	$ 4,570	$ 4,730	$ 4,490	$ 4,700	$ 4,608	
CVE-1	$ 470	$ 452	$ 450	$ 450	$ 450	$ 454	
CVE-2	$ 429	$ 435	$ 428	$ 430	$ 432	$ 431	
CVE-3	$ 434	$ 443	$ 433	$ 440	$ 450	$ 440	
SSL-1	$ 55	$ 52	$ 52	$ 53	$ 54	$ 53	
SSL-2	$ 46	$ 50	$ 48	$ 50	$ 48	$ 48	
SSL-3	$ 51	$ 51	$ 50	$ 52	$ 50	$ 51	
Adv. Budget							
TST-1	$ 320,000	$ 270,000	$ 160,000	$ 240,000	$ 330,000	$ 264,000	
TST-2	$ 300,000	$ 260,000	$ 180,000	$ 200,000	$ 100,000	$ 208,000	
TST-3	$ 270,000	$ 300,000	$ 160,000	$ 200,000	$ 250,000	$ 236,000	
CVE-1	$ 320,000	$ 320,000	$ 240,000	$ 210,000	$ 310,000	$ 280,000	
CVE-2	$ 300,000	$ 280,000	$ 250,000	$ 240,000	$ 180,000	$ 250,000	
CVE-3	$ 350,000	$ 270,000	$ 200,000	$ 210,000	$ 300,000	$ 266,000	
SSL-1	$ 270,000	$ 280,000	$ 200,000	$ 220,000	$ 160,000	$ 226,000	
SSL-2	$ 270,000	$ 270,000	$ 200,000	$ 200,000	$ 170,000	$ 222,000	
SSL-3	$ 270,000	$ 280,000	$ 190,000	$ 240,000	$ 200,000	$ 236,000	

well as other predictor variables such as (a) past academic performance (GPA) and academic ability of participants, and degree of planning and formal decision making by teams (Faria, 2000), (b) GPA and the use of DSSs (Keys and Wolfe, 1990), (c) age, gender, GPA and expected course grade (Badgett, Brenenstuhl & Marshall, 1978), (d) university GPA and academic major (Gosenpud & Washbush, 1991), (e) gender, GPA and course grade (Hornaday, 2001; Hornaday & Wheatley, 1986), (f) gender (Johnson, Johnson & Golden, 1997; Wood, 1987), (g) GPA, previous course grades, and course grade (Lynch and Michael, 1989), with conflicting results. These conflicting results led to the conclusion that no predictor variable consistently predicts simulation performance (Gosenpud, 1987).

The primary purpose of this paper is to present a new user-centered learning tool that provides participant teams the opportunity to assess the underlying reasons for any decrease in the sales-to-advertising ratio for each SBU within their SBU portfolio during each decision period, and thereby enhance their marketing effectiveness and efficiency.

MARKETING EFFECTIVENESS & EFFICIENCY

Marketing managers are charged with the responsibility of planning, organizing, implementing, and controlling marketing plans and programs that are designed to achieve a specific set of objectives (Bagozzi et al., 1998; Churchill and Peter, 1995; Kotler, 2003, 1988; Lehman and Winer, 1988; Lilien, 1993; Lilien and Rangaswamy, 2003; McCarthy and Perreault, 1984, 1987; Perreault and McCarthy, 1996). In performing their responsibilities, marketing managers are faced with scarce resources (discretionary marketing dollars) and unlimited wants to deploy these limited resources (sales force and advertising expenditures) in order to achieve their objectives. Consequently, they need to allocate the scarce resources at their disposal both effectively and efficiently. The efficient allocation of scarce marketing resources is facilitated through marketing control in order to keep performance in line with objectives.

Marketing control involves setting standards, monitoring performance, identifying deviations from standards, understanding the underlying reasons for the deviations, and taking corrective action when necessary (Bagozzi, et al., 1998; Churchill and Peter, 1995; Cravens, 2000; Cravens et al., 1987; Czinkota and Kotabe, 2001; Dalrymple and Parsons, 1995; Kotler and Keller, 2007; Lamb et al., 2004; Peter and Donnelly, 1994). First, marketing managers decide which aspects of marketing strategy (such as price, salesforce, advertising, quality) to monitor. Next, marketing managers set standards based on objectives in order to monitor and gauge performance. These standards may include sales targets, market share, profit contribution, as well as behavioral standards such as level of customer awareness. Then, marketing managers design feedback mechanisms where useful, relevant and timely information are used to evaluate the effectiveness of marketing activities. They use these feedback mechanisms to interpret the results of marketing programs, identify gaps between objectives and performance, understand the underlying reasons for the deviations in performance, and change strategy or tactics to eliminate or reduce the performance gaps and improve performance.

Marketing managers identify which products' sales are highest and why, which products are profitable, what is selling where, and how much the marketing process costs. They need to know what's happening in detail in order to improve the bottom line. Traditional accounting reports such as income statements and balance sheets are too general to be of much help to marketing

EXHIBIT 2
EFFICIENCY ANALYSIS WORKSHEET (CONTINUED)

Adv. Awareness							
TST-1						103	105
TST-2						100	99
TST-3						104	105
CVE-1						106	107
CVE-2						103	103
CVE-3						106	106
SSL-1						104	105
SSL-2						105	102
SSL-3						104	105
Salesforce Total	100	101	103	117	112	107	
Region 1	37	37	39	42	45	40	
Region 2	33	34	34	39	35	35	
Region 3	30	30	30	36	32	32	
Salary	$ 4,000	$ 4,000	$ 4,100	$ 4,185	$ 4,000	$ 4,057	
Commission	3.0%	2.8%	3.0%	2.8%	0.3%	2.4%	
Quality							
TST	102	102	103	102	103	102.40	102
CVE	101	101	101	101	102	101.20	101
SSL	100	100	100	100	100	100.00	100
Cost							
TST						$3,556.73	$3,558.32
CVE						$ 358.71	$ 358.81
SSL						$ 37.36	$ 37.24

managers. For instance, a company may be profitable while 80 percent of its business comes from 20 percent of its customers or products. The other relatively less profitable 80 percent may remain undetected unless each product, region, or customer segment is analyzed in order to determine its profitability. This 80/20 relationship is fairly common and is often referred to as the 80/20 rule or principle (McCarthy and Perreault, 1984, 1987; Perreault and McCarthy 1996).

Marketing control consists of sales analysis, performance analysis and marketing cost analysis. Sales analysis involves a detailed breakdown of the company's sales records by geographic region, product, package size, customer size, type or class of trade, price or discount class, method of sale (mail, telephone, or direct sales), terms of payment (cash or charge), size of order, and or commission class. The purpose of sales analysis is to keep marketing managers in touch with their markets and to enable them to check their assumptions and hypotheses. Performance analysis identifies exceptions or variations in planned performance.

Operating control consists of (a) checking ongoing performance against the annual plan and taking corrective action when necessary, and (b) determining the profitability of different products, regions, markets, and channels. Strategic control consists of assessing whether the company's basic strategies are aligned with its opportunities. With continuing changes in the marketplace and the non-controllable marketing environments, marketing strategies and programs can become outdated. Accordingly, companies should periodically reassess their overall approach to the marketplace (Kotler and Armstrong, 2018).

EXHIBIT 3
EFFICIENCY – SALES-TO-ADVERTISING RATION (BY SBU)

Efficiency - Sales-to-Advertising Ratio (by SBU)

TriniTech
Company 2
Period 6

Sales Revenue	Company 1	Company 2	Company 3	Company 4	Company 5	Indy. Avg.
Price						
TST - 1	$ 4,500	$ 4,530	$ 4,600	$ 4,500	$ 4,500	$ 4,526
TST - 2	$ 4,200	$ 4,370	$ 4,390	$ 4,350	$ 4,280	$ 4,318
TST - 3	$ 4,550	$ 4,570	$ 4,730	$ 4,490	$ 4,700	$ 4,608
CVE - 1	$ 470	$ 452	$ 450	$ 450	$ 450	$ 454
CVE - 2	$ 429	$ 435	$ 428	$ 430	$ 432	$ 431
CVE - 3	$ 434	$ 443	$ 433	$ 440	$ 450	$ 440
SSL - 1	$ 55	$ 52	$ 52	$ 53	$ 54	$ 53
SSL - 2	$ 46	$ 50	$ 48	$ 50	$ 48	$ 48
SSL - 3	$ 51	$ 51	$ 50	$ 52	$ 50	$ 51
Actual Sales						
TST - 1	815	700	824	662	700	740.2
TST - 2	972	721	888	743	516	768.0
TST - 3	575	600	826	608	600	641.8
CVE - 1	11,620	13,832	8,730	11,064	15,015	12,052.2
CVE - 2	16,561	15,706	11,056	17,195	14,041	14,911.8
CVE - 3	13,249	12,249	7,217	10,319	14,022	11,411.2
SSL - 1	62,869	85,797	79,040	83,023	53,349	72,815.6
SSL - 2	84,003	88,190	91,951	88,215	85,596	87,591.0
SSL - 3	57,031	71,134	67,073	83,963	52,919	66,424.0
Sales Revenue						
TST - 1	$ 3,667,500	$ 3,171,000	$ 3,790,400	$ 2,979,000	$ 3,150,000	$3,351,580
TST - 2	$ 4,082,400	$ 3,150,770	$ 3,898,320	$ 3,232,050	$ 2,208,480	$3,314,404
TST - 3	$ 2,616,250	$ 2,742,000	$ 3,906,980	$ 2,729,920	$ 2,820,000	$2,963,030
CVE - 1	$ 5,461,400	$ 6,252,064	$ 3,928,500	$ 4,978,800	$ 6,756,750	$5,475,503
CVE - 2	$ 7,104,669	$ 6,832,110	$ 4,731,968	$ 7,393,850	$ 6,065,712	$6,425,662
CVE - 3	$ 5,750,066	$ 5,426,307	$ 3,124,961	$ 4,540,360	$ 6,309,900	$5,030,319
SSL - 1	$ 3,457,795	$ 4,461,444	$ 4,110,080	$ 4,400,219	$ 2,880,846	$3,862,077
SSL - 2	$ 3,864,138	$ 4,409,500	$ 4,413,648	$ 4,410,750	$ 4,108,608	$4,241,329
SSL - 3	$ 2,908,581	$ 3,627,834	$ 3,353,650	$ 4,366,076	$ 2,645,950	$3,380,418

Marketing managers need to ensure that their marketing dollars are well spent. In recent years, the general marketing objective of "building brands and consumer preference," that involved substantial marketing expenditures, has been replaced by an era of marketing measurement and accountability. Currently, marketing managers are being held accountable for linking their strategies and tactics to measurable marketing performance outcomes. An important measure of marketing performance is marketing return on investment (marketing ROI).

MARKETING ROI

Marketing return on investment (or marketing ROI) is the net return from a marketing investment divided by the costs of the marketing investment. It measures the profits generated by investments in marketing activities. Marketing ROI can be measured in terms of standard marketing performance measures, such as brand awareness, sales, or market share (Kotler & Armstrong, 2018). Many companies use marketing dashboards that display meaningful sets of marketing performance measures in order to monitor strategic marketing performance (Mintz and Currim, 2013).

The importance of customer-focus in the marketing functions was recognized by several scholars (Drucker, 1954; Kotler, 1967; Levitt, 1960). Research on customer-centricity gained momentum in the 1990s with a growing awareness of the need to focus on customer-related factors such as customer satisfaction (Oliver, 1999), customer service (Parasuraman and Grewal, 2000); customer loyalty (Kumar and Shah, 2004; Reichheld, 2001; Capizzi and Ferguson, 2005), and customer-perceived quality (Boulding et al., 1993; Rust, Moorman, and Dickson, 2002).

Increasingly, marketers are using customer-centered measures of marketing impact, such as improved customer value, customer acquisition, customer engagement, customer experience, customer retention, customer loyalty, customer lifetime value, and customer equity.   These customer-centered measures capture both current and future marketing performance that results from building stronger customer relationships. In addition, increased customer equity divided by the cost of marketing investments determines return on marketing investment (Rust, 2007; Rust, Lemon & Zeithaml, 2004; Rust, Lemon & Narayandas, 2005; Korosec, 2012; Persson and Ryals, 2010; Zahay and Griffin, 2010).

In order to use customer-centered measures of marketing impact, firms need to adopt a customer-centric orientation. However, the path to becoming customer-centric is strewn with interrelated challenges such as organizational culture, organizational structure, processes and financial metrics (Shah, Rust, Parasuraman, Staelin and Day, 2006). Marketing ROI is difficult to measure (Ferguson, 2008) because marketing returns such as customer engagement, and the impact of advertising and brand-building are

EXHIBIT 4
EFFICIENCY – SALES-TO-ADVERTISING RATIO (BY SBU) (CONTINUED)

Advertising	Company 1	Company 2	Company 3	Company 4	Company 5	Indy. Avg.
TST - 1	$ 320,000	$ 270,000	$ 160,000	$ 240,000	$ 330,000	$ 264,000
TST - 2	$ 300,000	$ 260,000	$ 180,000	$ 200,000	$ 100,000	$ 208,000
TST - 3	$ 270,000	$ 300,000	$ 160,000	$ 200,000	$ 250,000	$ 236,000
CVE - 1	$ 320,000	$ 320,000	$ 240,000	$ 210,000	$ 310,000	$ 280,000
CVE - 2	$ 300,000	$ 280,000	$ 250,000	$ 240,000	$ 180,000	$ 250,000
CVE - 3	$ 350,000	$ 270,000	$ 200,000	$ 210,000	$ 300,000	$ 266,000
SSL - 1	$ 270,000	$ 280,000	$ 200,000	$ 220,000	$ 160,000	$ 226,000
SSL - 2	$ 270,000	$ 270,000	$ 200,000	$ 200,000	$ 170,000	$ 222,000
SSL - 3	$ 270,000	$ 280,000	$ 190,000	$ 240,000	$ 200,000	$ 236,000

Sales-to-Adv. Ratio	Company 1	Company 2	Company 3	Company 4	Company 5	Indy. Avg.
TST - 1	11.46	11.74	23.69	12.41	9.55	13.77
TST - 2	13.61	12.12	21.66	16.16	22.08	17.13
TST - 3	9.69	9.14	24.42	13.65	11.28	13.64
CVE - 1	17.07	19.54	16.37	23.71	21.80	19.70
CVE - 2	23.68	24.40	18.93	30.81	33.70	26.30
CVE - 3	16.43	20.10	15.62	21.62	21.03	18.96
SSL - 1	12.81	15.93	20.55	20.00	18.01	17.46
SSL - 2	14.31	16.33	22.07	22.05	24.17	19.79
SSL - 3	10.77	12.96	17.65	18.19	13.23	14.56

difficult to quantify in dollar terms. In addition, marketing ROI requires extensive data gathering and analysis, and can take years to implement (Bradbury and Kissel, 2006), leading to potential misunderstandings and misuse (Bendle and Bagga, 2016).

Despite the prominence of customer-centric marketing ROI concepts such as customer value analysis (Desarbo, Jedidi & Sinha, 2001), customer acquisition, customer engagement, customer experience, customer retention, customer loyalty, customer lifetime value, and customer equity in the marketing literature, there is a dearth of publications on relationship marketing, customer lifetime value and customer equity in the simulation and gaming literature (Cannon, Cannon and Schwaiger, 2005). Emerging trends such as online advertising/marketing, use of social media, and marketing/advertising/promotion ROI measures, which increase simulation realism and complexity, need to be included in marketing simulations. Given the challenges in adopting a customer-centric orientation, and measuring marketing returns such as customer engagement, other measures of effectiveness and efficiency such as advertising/sales (A/S ratio), advertising and promotion/sales (A&P/S ratio) and sales-to-advertising ratio are used.

ADVERTISING EFFECTIVENESS & EFFICIENCY

Econometric models using aggregate data suggest that advertising has a significant positive impact on sales in the current period (Assmus, Farley, and Lehmann, 1984; Sethuraman and Tellis 1991). However, recent studies based on disaggregated scanner data estimate only weak or nonsignificant effects of advertising on brand choices (Kanetkar, Weinberg, and Weiss, 1992; Tellis 1988). Tellis & Weiss (1995) hypothesized that advertising plays a nondetectable role in the choice of brands in discrete time. While advertising budgets have increased based on the belief that advertising enhances brand equity, some researchers claim that advertising is "rife with productivity problems" (Sheth and Sisodia, 1995). Consequently, there is growing emphasis on accountability of advertising results (Bhargava, Donthu, and Caron, 1994),

Researchers have investigated and attempted to explain variations in advertising and promotion/sales (A&P/S) ratios across

EXHIBIT 5
EFFICIENCY – SALES-TO-ADVERTISING RATIO (SALES DETERMINANTS)

Efficiency Sales-to-Advertising Ratio (Sales Determinants)							
	Company 1	Company 2	Company 3	Company 4	Company 5	NAEM Indy. Avg.	Our Company
Price							
TST-1	$ 4,500	$ 4,530	$ 4,600	$ 4,500	$ 4,500	$ 4,526	
TST-2	$ 4,200	$ 4,370	$ 4,390	$ 4,350	$ 4,280	$ 4,318	
TST-3	$ 4,550	$ 4,570	$ 4,730	$ 4,490	$ 4,700	$ 4,608	
CVE-1	$ 470	$ 452	$ 450	$ 450	$ 450	$ 454	
CVE-2	$ 429	$ 435	$ 428	$ 430	$ 432	$ 431	
CVE-3	$ 434	$ 443	$ 433	$ 440	$ 450	$ 440	
SSL-1	$ 55	$ 52	$ 52	$ 53	$ 54	$ 53	
SSL-2	$ 46	$ 50	$ 48	$ 50	$ 48	$ 48	
SSL-3	$ 51	$ 51	$ 50	$ 52	$ 50	$ 51	
Adv. Budget							
TST-1	$ 320,000	$ 270,000	$ 160,000	$ 240,000	$ 330,000	$ 264,000	
TST-2	$ 300,000	$ 260,000	$ 180,000	$ 200,000	$ 100,000	$ 208,000	
TST-3	$ 270,000	$ 300,000	$ 160,000	$ 200,000	$ 250,000	$ 236,000	
CVE-1	$ 320,000	$ 320,000	$ 240,000	$ 210,000	$ 310,000	$ 280,000	
CVE-2	$ 300,000	$ 280,000	$ 250,000	$ 240,000	$ 180,000	$ 250,000	
CVE-3	$ 350,000	$ 270,000	$ 200,000	$ 210,000	$ 300,000	$ 266,000	
SSL-1	$ 270,000	$ 280,000	$ 200,000	$ 220,000	$ 160,000	$ 226,000	
SSL-2	$ 270,000	$ 270,000	$ 200,000	$ 200,000	$ 170,000	$ 222,000	
SSL-3	$ 270,000	$ 280,000	$ 190,000	$ 240,000	$ 200,000	$ 236,000	
Adv. Awareness							
TST-1						103	105
TST-2						100	99
TST-3						104	105
CVE-1						106	107
CVE-2						103	103
CVE-3						106	106
SSL-1						104	105
SSL-2						105	102
SSL-3						104	105

brands, product-market categories, firms, and industries. Balasubramaniam and Kumar (1990) concluded that two variables, market share and market growth, together with an interaction term, explain more than 70 percent of the variation in the A&P/S ratio. Previous attempts at explaining variations in the A&P/S ratio used industry concentration, gross margin, net profit rates, amount and frequency of purchase, number of users, type of good (convenience/shopping, durable/nondurable), number of new products, capacity utilization, degree of customization, importance of auxiliary services and relative prices as explanatory variables. However, a subsequent research study concluded that market share and market growth are not significant predictors of A&P/S over time or across firms, SBUs or brands (Ailawadi, Farris & Parry, 1994).

With the advent of the Internet, online advertising researchers refer to the Internet's capabilities of addressing individual customers (Deighton 1997), its interactivity and ability to store vast amounts of information (Peterson, Balasubramaniam, and Bronnenberg, 1997), and the fact that it permits customers to seek unique solutions to their needs (Sheth, Sisodia, and Sharma, 2000). Further, online advertising attracts attention as advertisers favor deriving maximum response from selected target segments instead of maximum exposure to multiple unknown segments (Yoon and Kim, 2001). The accountability of online advertising and its contribution to marketing efficiency and effectiveness are expected to lead to further growth in Web-based advertising efforts (Brackett and Carr, 2001; Hollis, 2005; Sharma and Sheth, 2004). A recent empirical study concluded that firms that had consistently invested in online advertising achieved greater efficiency, and this effect was more pronounced in the long term (Pergelova, Prior and Rialp, 2010).

The Internet has spawned a variety of social media applications such as blogs, microblogging (Twitter), cocreation (NikeID), social bookmarking (StumbleUpon), forums and discussion boards (Google Groups), product reviews (Amazon), social networks (such as Bebo, Facebook, Linkedin), and video and photo sharing (Flickr, YouTube). Relevant metrics have been proposed for each of these social media applications organized by key social media objectiveness during the stages of brand awareness, brand engagement, and word of mouth (Hoffman and Fodor, 2010). Yet, many firms are struggling with social media ROI measurement. Gilfoil and Jobs (2012) proposed a 3D unit of analysis framework which indicates the limited circumstances where social media projects can be evaluated in terms of traditional financial ROI, and later suggested a partial reallocation of investment funds away from traditional, more expensive media towards more cost-effective social media platforms (Jobs & Gilfoil, 2014).

Given the impediments to adopting a customer-centric orientation, challenges in measuring marketing ROI, and contradictory results of past studies on advertising effectiveness and efficiency, simulation researchers have focused on simulation advertising response models (Gold & Pray, 1983; House & Napier, 1988; Lambert & Lambert, 1988; Goosen, 1995; Cannon, Leckenby & Abernethy, 1996; Cannon, Ramachandran & Riordan, 1998; Goosen, 2010; Gold, Markulis & Strang, 2011). Accordingly, the sales-to-advertising ratio is used to measure and rank the competing firms on advertising effectiveness and efficiency.

SALES-TO-ADVERTISING RATIO

Effective marketing managers monitor their results, identify sub-par performance, understand the underlying reasons for sub-par performance, and take corrective action. The Efficiency Analysis package enables competing participant teams to monitor and assess the effectiveness and efficiency of their advertising and other marketing efforts. The Sales-to-Advertising Ratio is one of the eighteen measures of performance that competing teams are ranked on every decision period in the COMPETE simulation. The rankings are based on the cumulative sales revenue in dollars divided by the cumulative advertising expenditures till the current period.

The sales revenue in the COMPETE simulation is a function of (a) the price (for each SBU), (b) the unit sales (for each

EXHIBIT 6
EFFICIENCY – SALES-TO-ADVERTISING RATIO (SALES DETERMINANTS) (CONTINUED)

Salesforce Total	100	101	103	117	112	107	
Region 1	37	37	39	42	45	40	
Region 2	33	34	34	39	35	35	
Region 3	30	30	30	36	32	32	
Salary	$ 4,000	$ 4,000	$ 4,100	$ 4,185	$ 4,000	$ 4,057	
Commission	3.0%	2.8%	3.0%	2.8%	0.3%	2.4%	
Quality							
TST	102	102	103	102	103	102.40	102
CVE	101	101	101	101	102	101.20	101
SSL	100	100	100	100	100	100.00	100
Cost							
TST						$ 3,556.73	$3,558.32
CVE						$ 358.71	$ 358.81
SSL						$ 37.36	$ 37.24

SBU) which is a function of the interaction between the supply (unit shipments of each SBU) and demand in units generated (for each SBU), (c) the broadcast, print and sales promotion advertising budgets (for each SBU), (d) the advertising message selected (for each SBU), (e) the sales force size (in each region), (f) the sales force time allocation (for each product in each region), (g) the sales force salary (company-wide), (h) sales force commission (company-wide), and (i) quality (for each product) based on R&D investment in quality improvement (for each product).

The relevant advertising-related decision variables in the COMPETE simulation are (a) the broadcast, print, and sales promotion media budgets, and (b) the advertising copy (message) used for each of the nine SBUs. The competing teams receive feedback on the advertising awareness index (for each SBU) relative to the industry-wide advertising awareness indices (for each SBU). These advertising awareness indices reflect the quality of their advertising strategy (choice of appropriate media and message for each SBU target market). The unit sales and market share (of each SBU) is affected by both the quantity (media budget) and quality (advertising media emphasis and advertising copy/message emphasis) of the advertising effort.

The Efficiency Analysis package extracts and identifies the above antecedents of sales and advertising (for each SBU for all competing firms) from the COMPETE simulation results for each decision period. Competing participant teams use this package to identify and better understand the underlying reasons for deviant sales-to-advertising ratio performance and to take corrective action.

COMPETE MARKETING SIMULATION

COMPETE (Faria, 2006) is a marketing simulation designed to provide students with marketing strategy development and decision-making experience. Competing student teams are placed in a complex, dynamic, and uncertain environment. The participants experience the excitement and uncertainty of competitive events and are motivated to be active seekers of knowledge. They learn the need for, and usefulness of, mastering an underlying set of decision-making principles.

Competing student teams plan, implement, and control a marketing program for three high-tech products in three regions Region 1 (R1), Region 2 (R2) and Region 3 (R3) within the United States. These three products are a Total Spectrum Television (TST), a Computerized DVD/Video Editor (CVE) and a Safe Shot Laser (SSL). The features and benefits of each product and the characteristics of consumers in each region are described in the student manual. Based on a marketing opportunity analysis, a mission statement is generated, specific and measurable company goals are set, and marketing strategies are formulated to achieve these goals. Constant monitoring and analysis of their own and competitive performance helps the teams better understand their markets and improve their decisions.

Each decision period (quarter), the competing teams make a total of 74 marketing decisions with regard to marketing their three brands in the three regional markets. These 74 decisions include nine pricing decisions, nine shipment decisions, three sales force size decisions, nine sales force time allocation decisions, one sales force salary decision, one sales force commission decision, twenty-seven advertising media decisions, nine advertising content decisions, three quality-improvement R&D decisions, and three

EXHIBIT 7
DATA EXTRACTION TABLE FOR EFFICIENCY ANALYSIS WORKSHEET
(REVENUE & ADVERTISING)

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (Revenue Determinants 1)						
COMPETE Efficiency Analysis Worksheet			**COMPETE Results Workbook Period.xls**			
Account	**Cell**		**Worksheet (Tab)**	**Page #**	**Account**	**Cell Ref.**
Company Name	A4	from ==>	Title	Title Page		C15
Company Number	A5	from ==>	Title	Title Page		C14
Period	A6	from ==>	Title	Title Page		C16
Sales Revenue - Company 1	B10	from ==>	Quality, Dollar Sales	14	Company 1 Dollar Sales	G29
Sales Revenue - Company 2	C10	from ==>	Quality, Dollar Sales	14	Company 2 Dollar Sales	G30
Sales Revenue - Company 3	D10	from ==>	Quality, Dollar Sales	14	Company 3 Dollar Sales	G31
Sales Revenue - Company 4	E10	from ==>	Quality, Dollar Sales	14	Company 4 Dollar Sales	G32
Sales Revenue - Company 5	F10	from ==>	Quality, Dollar Sales	14	Company 5 Dollar Sales	G33
Region 1 Advertising - Company 1	B11	from ==>	Full Ad., Content	12	Company 1 Reg 1 Adv. (BC+PRT+SP)	(E10+F10+…+M10) x 1000000
Region 1 Advertising - Company 2	C11	from ==>	Full Ad., Content	12	Company 2 Reg 1 Adv. (BC+PRT+SP)	(E13+F13+…+M13) x 1000000
Region 1 Advertising - Company 3	D11	from ==>	Full Ad., Content	12	Company 3 Reg 1 Adv. (BC+PRT+SP)	(E16+F16+…+M16) x 1000000
Region 1 Advertising - Company 4	E11	from ==>	Full Ad., Content	12	Company 4 Reg 1 Adv. (BC+PRT+SP)	(E19+F19+…+M19) x 1000000
Region 1 Advertising - Company 5	F11	from ==>	Full Ad., Content	12	Company 5 Reg 1 Adv. (BC+PRT+SP)	(E22+F22+…+M22) x 1000000
Region 2 Advertising - Company 1	B12	from ==>	Full Ad., Content	12	Company 1 Reg 2 Adv. (BC+PRT+SP)	(E11+F11+…+M11) x 1000000
Region 2 Advertising - Company 2	C12	from ==>	Full Ad., Content	12	Company 2 Reg 2 Adv. (BC+PRT+SP)	(E14+F14+…+M14) x 1000000
Region 2 Advertising - Company 3	D12	from ==>	Full Ad., Content	12	Company 3 Reg 2 Adv. (BC+PRT+SP)	(E17+F17+…+M17) x 1000000
Region 2 Advertising - Company 4	E12	from ==>	Full Ad., Content	12	Company 4 Reg 2 Adv. (BC+PRT+SP)	(E20+F20+…+M20) x 1000000
Region 2 Advertising - Company 5	F12	from ==>	Full Ad., Content	12	Company 5 Reg 2 Adv. (BC+PRT+SP)	(E23+F23+…+M23) x 1000000
Region 3 Advertising - Company 1	B13	from ==>	Full Ad., Content	12	Company 1 Reg 3 Adv. (BC+PRT+SP)	(E12+F12+…+M12) x 1000000
Region 3 Advertising - Company 2	C13	from ==>	Full Ad., Content	12	Company 2 Reg 3 Adv. (BC+PRT+SP)	(E15+F15+…+M15) x 1000000
Region 3 Advertising - Company 3	D13	from ==>	Full Ad., Content	12	Company 3 Reg 3 Adv. (BC+PRT+SP)	(E18+F18+…+M18) x 1000000
Region 3 Advertising - Company 4	E13	from ==>	Full Ad., Content	12	Company 4 Reg 3 Adv. (BC+PRT+SP)	(E21+F21+…+M21) x 1000000
Region 3 Advertising - Company 5	F13	from ==>	Full Ad., Content	12	Company 5 Reg 3 Adv. (BC+PRT+SP)	(E24+F24+…+M24) x 1000000

cost-reduction R&D decisions. Successful planning, implementation, and control of their respective marketing programs require that each company constantly monitor trends in its own and competitive decision variables and resulting performance. The teams use the COMPETE Online Decision Entry System (CODES) (Palia & Mak, 2001; Palia et al., 2000) to enter their decisions, retrieve their results, and download and use a wide array of marketing dss packages.

The comprehensive Online Cumulative Simulation Team Performance Package provides competing participant teams with feedback on their cumulative company profitability, market share by product, quality by product, cost of production by product, and efficiency with the simulation results for each decision period (Palia 2005). The Efficiency Analysis package extracts and identifies the antecedents of the sales-to-advertising ratio for each SBU from the COMPETE simulation results for each decision period in order to help understand the underlying reasons for deviant performance.

THE EFFICIENCY ANALYSIS PACKAGE

The Web-based Efficiency Analysis Package is accessible online to competing participant teams in the marketing simulation COMPETE. It enables competing participant teams to learn, identify and assess the underlying reasons for change in sales-to-advertising ratio for each SBU within their SBU portfolio during each decision period. Competing participant teams can use this package to monitor performance, identify deviations, understand the underlying reasons, take corrective action and thereby exercise marketing control.

The Efficiency Analysis package extracts relevant antecedents of the sales-to-advertising ratio for each of the SBUs in the SBU portfolio.   This package is a zipped folder "Performance Efficiency.zip" which consists of (a) an Excel workbook

EXHIBIT 8
DATA EXTRACTION TABLE FOR EFFICIENCY ANALYSIS WORKSHEET (PRICE)

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (Price Determinants)						
COMPETE Efficiency Analysis Worksheet			COMPETE Results Workbook Period.xls			
Account	Cell		Worksheet (Tab)	Page #	Account	Cell Ref.
TST-1 Price - Company 1	B20	from ==>	Forecast, Prices	9	Company 1 TST - Region 1 Price	D32
TST-1 Price - Company 2	C20	from ==>	Forecast, Prices	9	Company 2 TST - Region 1 Price	D33
TST-1 Price - Company 3	D20	from ==>	Forecast, Prices	9	Company 3 TST - Region 1 Price	D34
TST-1 Price - Company 4	E20	from ==>	Forecast, Prices	9	Company 4 TST - Region 1 Price	D35
TST-1 Price - Company 5	F20	from ==>	Forecast, Prices	9	Company 5 TST - Region 1 Price	D36
TST-2 Price - Company 1	B21	from ==>	Forecast, Prices	9	Company 1 TST - Region 2 Price	G32
TST-2 Price - Company 2	C21	from ==>	Forecast, Prices	9	Company 2 TST - Region 2 Price	G33
TST-2 Price - Company 3	D21	from ==>	Forecast, Prices	9	Company 3 TST - Region 2 Price	G34
TST-2 Price - Company 4	E21	from ==>	Forecast, Prices	9	Company 4 TST - Region 2 Price	G35
TST-2 Price - Company 5	F21	from ==>	Forecast, Prices	9	Company 5 TST - Region 2 Price	G36
TST-3 Price - Company 1	B22	from ==>	Forecast, Prices	9	Company 1 TST - Region 3 Price	J32
TST-3 Price - Company 2	C22	from ==>	Forecast, Prices	9	Company 2 TST - Region 3 Price	J33
TST-3 Price - Company 3	D22	from ==>	Forecast, Prices	9	Company 3 TST - Region 3 Price	J34
TST-3 Price - Company 4	E22	from ==>	Forecast, Prices	9	Company 4 TST - Region 3 Price	J35
TST-3 Price - Company 5	F22	from ==>	Forecast, Prices	9	Company 5 TST - Region 3 Price	J36
CVE-1 Price - Company 1	B23	from ==>	Forecast, Prices	9	Company 1 CVE - Region 1 Price	E32
CVE-1 Price - Company 2	C23	from ==>	Forecast, Prices	9	Company 2 CVE - Region 1 Price	E33
CVE-1 Price - Company 3	D23	from ==>	Forecast, Prices	9	Company 3 CVE - Region 1 Price	E34
CVE-1 Price - Company 4	E23	from ==>	Forecast, Prices	9	Company 4 CVE - Region 1 Price	E35
CVE-1 Price - Company 5	F23	from ==>	Forecast, Prices	9	Company 5 CVE - Region 1 Price	E36
CVE-2 Price - Company 1	B24	from ==>	Forecast, Prices	9	Company 1 CVE - Region 2 Price	H32
CVE-2 Price - Company 2	C24	from ==>	Forecast, Prices	9	Company 2 CVE - Region 2 Price	H33
CVE-2 Price - Company 3	D24	from ==>	Forecast, Prices	9	Company 3 CVE - Region 2 Price	H34
CVE-2 Price - Company 4	E24	from ==>	Forecast, Prices	9	Company 4 CVE - Region 2 Price	H35
CVE-2 Price - Company 5	F24	from ==>	Forecast, Prices	9	Company 5 CVE - Region 2 Price	H36
CVE-3 Price - Company 1	B25	from ==>	Forecast, Prices	9	Company 1 CVE - Region 3 Price	K32
CVE-3 Price - Company 2	C25	from ==>	Forecast, Prices	9	Company 2 CVE - Region 3 Price	K33
CVE-3 Price - Company 3	D25	from ==>	Forecast, Prices	9	Company 3 CVE - Region 3 Price	K34
CVE-3 Price - Company 4	E25	from ==>	Forecast, Prices	9	Company 4 CVE - Region 3 Price	K35
CVE-3 Price - Company 5	F25	from ==>	Forecast, Prices	9	Company 5 CVE - Region 3 Price	K36
SSL-1 Price - Company 1	B26	from ==>	Forecast, Prices	9	Company 1 SSL - Region 1 Price	F32
SSL-1 Price - Company 2	C26	from ==>	Forecast, Prices	9	Company 2 SSL - Region 1 Price	F33
SSL-1 Price - Company 3	D26	from ==>	Forecast, Prices	9	Company 3 SSL - Region 1 Price	F34
SSL-1 Price - Company 4	E26	from ==>	Forecast, Prices	9	Company 4 SSL - Region 1 Price	F35
SSL-1 Price - Company 5	F26	from ==>	Forecast, Prices	9	Company 5 SSL - Region 1 Price	F36
SSL-2 Price - Company 1	B27	from ==>	Forecast, Prices	9	Company 1 SSL - Region 2 Price	I32
SSL-2 Price - Company 2	C27	from ==>	Forecast, Prices	9	Company 2 SSL - Region 2 Price	I33
SSL-2 Price - Company 3	D27	from ==>	Forecast, Prices	9	Company 3 SSL - Region 2 Price	I34
SSL-2 Price - Company 4	E27	from ==>	Forecast, Prices	9	Company 4 SSL - Region 2 Price	I35
SSL-2 Price - Company 5	F27	from ==>	Forecast, Prices	9	Company 5 SSL - Region 2 Price	I36
SSL-3 Price - Company 1	B28	from ==>	Forecast, Prices	9	Company 1 SSL - Region 3 Price	L32
SSL-3 Price - Company 2	C28	from ==>	Forecast, Prices	9	Company 2 SSL - Region 3 Price	L33
SSL-3 Price - Company 3	D28	from ==>	Forecast, Prices	9	Company 3 SSL - Region 3 Price	L34
SSL-3 Price - Company 4	E28	from ==>	Forecast, Prices	9	Company 4 SSL - Region 3 Price	L35
SSL-3 Price - Company 5	F28	from ==>	Forecast, Prices	9	Company 5 SSL - Region 3 Price	L36

"Efficiency.xls" (with external links to the COMPETE results (output) file "Period.xls") and (b) Excel version of sample COMPETE output file the decision period being analyzed. This Efficiency.xls workbook consists of two worksheets; Efficiency (see exhibits 1 & 2) and Efficiency by SBU (see exhibits 3 & 4).

Each of the worksheets consists of external links to the Excel version of the COMPETE output file "Period.xls" for a specific decision period. Both these worksheets extract and display the company name and company number from the Excel version of the COMPETE results file "Period.xls" (see exhibits 1 & 2). The Efficiency worksheet enables competing participant teams to assess the Sales-to-Advertising ratio for each of the competing firms. It extracts and displays the Sales Revenue for each company from the Company Dollar Sales Report in the COMPETE results file "Period.xls". Further, in order to calculate and display the Sales-to-Advertising ratio for each company, the Efficiency worksheet extracts and calculates the regional advertising media expenditure (sum of broadcast, print, and sales promotion) for each of the competing firms. The Sales-to-Advertising ratio for each of the competing firms is the Sales Revenue divided by the sum of regional advertising expenditures. In addition, the Efficiency worksheet extracts and presents the price and the advertising media budget (broadcast + print + sales promotion) for each of the nine SBUs for all competing firms (see Exhibit 1).

Next, the Efficiency worksheet extracts and presents the company and industry Advertising Awareness Indices for each of

EXHIBIT 9
DATA EXTRACTION TABLE FOR EFFICIENCY ANALYSIS WORKSHEET
(SBU ADVERTISING)

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (Advertising Budget Determinants)

COMPETE Efficiency Analysis Worksheet			COMPETE Results Workbook Period.xls			
Account	Cell		Worksheet (Tab)	Page #	Account	Cell Ref.
Company 1 Advertising Budget - TST-1	B30	from ==>	Full Ad., Content	12	TST-1 Advertising Budget - Company 1	(E10+F10+G10) x 1000000
Company 1 Advertising Budget - TST-2	B31	from ==>	Full Ad., Content	12	TST-2 Advertising Budget - Company 1	(E11+F11+G11) x 1000000
Company 1 Advertising Budget - TST-3	B32	from ==>	Full Ad., Content	12	TST-3 Advertising Budget - Company 1	(E12+F12+G12) x 1000000
Company 1 Advertising Budget - CVE-1	B33	from ==>	Full Ad., Content	12	CVE-1 Advertising Budget - Company 1	(H10+I10+J10) x 1000000
Company 1 Advertising Budget - CVE-2	B34	from ==>	Full Ad., Content	12	CVE-2 Advertising Budget - Company 1	(H11+I11+J11) x 1000000
Company 1 Advertising Budget - CVE-3	B35	from ==>	Full Ad., Content	12	CVE-3 Advertising Budget - Company 1	(H12+I12+J12) x 1000000
Company 1 Advertising Budget - SSL-1	B36	from ==>	Full Ad., Content	12	SSL-1 Advertising Budget - Company 1	(K10+L10+M10) x 1000000
Company 1 Advertising Budget - SSL-2	B37	from ==>	Full Ad., Content	12	SSL-2 Advertising Budget - Company 1	(K11+L11+M11) x 1000000
Company 1 Advertising Budget - SSL-3	B38	from ==>	Full Ad., Content	12	SSL-3 Advertising Budget - Company 1	(K12+L12+M12) x 1000000
Company 2 Advertising Budget - TST-1	C30	from ==>	Full Ad., Content	12	TST-1 Advertising Budget - Company 2	(E13+F13+G13) x 1000000
Company 2 Advertising Budget - TST-2	C31	from ==>	Full Ad., Content	12	TST-2 Advertising Budget - Company 2	(E14+F14+G14) x 1000000
Company 2 Advertising Budget - TST-3	C32	from ==>	Full Ad., Content	12	TST-3 Advertising Budget - Company 2	(E15+F15+G15) x 1000000
Company 2 Advertising Budget - CVE-1	C33	from ==>	Full Ad., Content	12	CVE-1 Advertising Budget - Company 2	(H13+I13+J13) x 1000000
Company 2 Advertising Budget - CVE-2	C34	from ==>	Full Ad., Content	12	CVE-2 Advertising Budget - Company 2	(H14+I14+J14) x 1000000
Company 2 Advertising Budget - CVE-3	C35	from ==>	Full Ad., Content	12	CVE-3 Advertising Budget - Company 2	(H15+I15+J15) x 1000000
Company 2 Advertising Budget - SSL-1	C36	from ==>	Full Ad., Content	12	SSL-1 Advertising Budget - Company 2	(K13+L13+M13) x 1000000
Company 2 Advertising Budget - SSL-2	C37	from ==>	Full Ad., Content	12	SSL-2 Advertising Budget - Company 2	(K14+L14+M14) x 1000000
Company 2 Advertising Budget - SSL-3	C38	from ==>	Full Ad., Content	12	SSL-3 Advertising Budget - Company 2	(K15+L15+M15) x 1000000
Company 3 Advertising Budget - TST-1	D30	from ==>	Full Ad., Content	12	TST-1 Advertising Budget - Company 3	(E16+F16+G16) x 1000000
Company 3 Advertising Budget - TST-2	D31	from ==>	Full Ad., Content	12	TST-2 Advertising Budget - Company 3	(E17+F17+G17) x 1000000
Company 3 Advertising Budget - TST-3	D32	from ==>	Full Ad., Content	12	TST-3 Advertising Budget - Company 3	(E18+F18+G18) x 1000000
Company 3 Advertising Budget - CVE-1	D33	from ==>	Full Ad., Content	12	CVE-1 Advertising Budget - Company 3	(H16+I16+J16) x 1000000
Company 3 Advertising Budget - CVE-2	D34	from ==>	Full Ad., Content	12	CVE-2 Advertising Budget - Company 3	(H17+I17+J17) x 1000000
Company 3 Advertising Budget - CVE-3	D35	from ==>	Full Ad., Content	12	CVE-3 Advertising Budget - Company 3	(H18+I18+J18) x 1000000
Company 3 Advertising Budget - SSL-1	D36	from ==>	Full Ad., Content	12	SSL-1 Advertising Budget - Company 3	(K16+L16+M16) x 1000000
Company 3 Advertising Budget - SSL-2	D37	from ==>	Full Ad., Content	12	SSL-2 Advertising Budget - Company 3	(K17+L17+M17) x 1000000
Company 3 Advertising Budget - SSL-3	D38	from ==>	Full Ad., Content	12	SSL-3 Advertising Budget - Company 3	(K18+L18+M18) x 1000000
Company 4 Advertising Budget - TST-1	E30	from ==>	Full Ad., Content	12	TST-1 Advertising Budget - Company 4	(E19+F19+G19) x 1000000
Company 4 Advertising Budget - TST-2	E31	from ==>	Full Ad., Content	12	TST-2 Advertising Budget - Company 4	(E20+F20+G20) x 1000000
Company 4 Advertising Budget - TST-3	E32	from ==>	Full Ad., Content	12	TST-3 Advertising Budget - Company 4	(E21+F21+G11) x 1000000
Company 4 Advertising Budget - CVE-1	E33	from ==>	Full Ad., Content	12	CVE-1 Advertising Budget - Company 4	(H19+I19+J19) x 1000000
Company 4 Advertising Budget - CVE-2	E34	from ==>	Full Ad., Content	12	CVE-2 Advertising Budget - Company 4	(H20+I20+J20) x 1000000
Company 4 Advertising Budget - CVE-3	E35	from ==>	Full Ad., Content	12	CVE-3 Advertising Budget - Company 4	(H21+I21+J21) x 1000000
Company 4 Advertising Budget - SSL-1	E36	from ==>	Full Ad., Content	12	SSL-1 Advertising Budget - Company 4	(K19+L19+M19) x 1000000
Company 4 Advertising Budget - SSL-2	E37	from ==>	Full Ad., Content	12	SSL-2 Advertising Budget - Company 4	(K20+L20+M20) x 1000000
Company 4 Advertising Budget - SSL-3	E38	from ==>	Full Ad., Content	12	SSL-3 Advertising Budget - Company 4	(K21+L21+M21) x 1000000
Company 5 Advertising Budget - TST-1	F30	from ==>	Full Ad., Content	12	TST-1 Advertising Budget - Company 5	(E22+F22+G22) x 1000000
Company 5 Advertising Budget - TST-2	F31	from ==>	Full Ad., Content	12	TST-2 Advertising Budget - Company 5	(E23+F23+G23) x 1000000
Company 5 Advertising Budget - TST-3	F32	from ==>	Full Ad., Content	12	TST-3 Advertising Budget - Company 5	(E24+F24+G24) x 1000000
Company 5 Advertising Budget - CVE-1	F33	from ==>	Full Ad., Content	12	CVE-1 Advertising Budget - Company 5	(H22+I22+J22) x 1000000
Company 5 Advertising Budget - CVE-2	F34	from ==>	Full Ad., Content	12	CVE-2 Advertising Budget - Company 5	(H23+I23+J23) x 1000000
Company 5 Advertising Budget - CVE-3	F35	from ==>	Full Ad., Content	12	CVE-3 Advertising Budget - Company 5	(H24+I24+J24) x 1000000
Company 5 Advertising Budget - SSL-1	F36	from ==>	Full Ad., Content	12	SSL-1 Advertising Budget - Company 5	(K22+L22+M22) x 1000000
Company 5 Advertising Budget - SSL-2	F37	from ==>	Full Ad., Content	12	SSL-2 Advertising Budget - Company 5	(K23+L23+M23) x 1000000
Company 5 Advertising Budget - SSL-3	F38	from ==>	Full Ad., Content	12	SSL-3 Advertising Budget - Company 5	(K24+L24+M24) x 1000000

the nine SBUs from the National Association of Electronics Manufacturers (NAEM) Bulletin in the COMPETE results file "Period.xls". In addition, the Efficiency worksheet extracts and presents the regional as well as total company salesforce size, and the salesforce salary and commission from the marketing research reports in the COMPETE results file "Period.xls". Further, the Efficiency worksheet extracts and presents the quality index of all three products for all competing firms from the market research report, and extracts and compares the industry and company quality indices for each product from the NAEM bulletin. Finally, the Efficiency worksheet extracts and compares the industry and company unit cost of production for each product from the NAEM bulletin (see exhibit 2).

The Efficiency by SBU worksheet enables competing participant teams to assess the Sales-to-Advertising ratio for each of the nine SBUs. This worksheet extracts and presents the price and actual quantity sold in units for each of the nine SBUs for all competing firms. The SBU sales revenue is then calculated by multiplying the price by the corresponding unit sales for each SBU for each company (see exhibit 3).

Next, the Efficiency by SBU worksheet extracts the broadcast (BC), print (PRT), and sales promotion (SP) media budgets for each of the nine SBUs for each company. It then calculates the total advertising media budget (BC + PRT + SP) for each of the nine SBUs for each of the competing firms. Later it divides the SBU sales revenue by the total advertising media budget for each SBU for each company in order to compute the Sales-to-Advertising ratio for each of the nine SBUs for each company (see exhibit 4).

In order to assess the reasons for an SBU sales-to-advertising ratio that is lower than the corresponding SBU sales-to-advertising ratios for competing firms, the Efficiency by SBU worksheet extracts and presents the determinants of both the sales (numerator) and advertising (denominator) of each SBU sales-to-advertising ratio. First, this worksheet extracts and presents the price of each SBU and the total advertising budget (BC + PRT + SP) for each of the competing firms. Next, the worksheet extracts and presents the Advertising Awareness Indices for each of the nine SBUs relative to the NAEM Average from the NAEM Bulletin Report. The Advertising Awareness Indices (on a scale from 92 "the pits" to 108 "the tops" with 100 as the average) reflect the quality and appropriateness of the advertising media emphasis and advertising copy (message) emphasis for each of the nine SBU target markets. The price, advertising budget and advertising awareness indices are the first three determinants of the sales (numerator) of each SBU sales-to-advertising ratio (see exhibit 5).

Further, the Efficiency by SBU worksheet extracts and presents the remaining determinants of sales (numerator) of each SBU sales-to-advertising ratio, such as the total salesforce and regional salesforce size, salesforce salary, and salesforce commission of each of the competing firms, and computes the industry averages for each of the above measures. In addition, the Efficiency by SBU worksheet extracts and presents the quality of each of the three products for each of the companies. Lastly the worksheet extracts and compares the quality and unit cost of production of each of the three products with the NAEM Industry Average (see exhibit 6).

The relevant data are extracted from the COMPETE Results Excel workbook "Period.xls" to each of the Efficiency Analysis worksheets as indicated in the Data Extraction Tables for Sales Revenue and Advertising (see exhibit 7), Price (see exhibit 8), SBU Advertising (see exhibit 9), SBU Advertising Awareness (see exhibit 10), Salesforce (see exhibit 11), Quality and Cost of Production (see exhibit 12), SBU Price (see exhibit 13), and SBU Unit Sales (exhibit 14). In each of the Data Extraction Tables, the

EXHIBIT 10
DATA EXTRACTION TABLE FOR EFFICIENCY ANALYSIS WORKSHEET
(SBU ADVERTISING AWARENESS)

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (Advertising Awareness Determinants)							
COMPETE Efficiency Analysis Worksheet			**COMPETE Results Workbook Period.xls**				
Account	Cell		Worksheet (Tab)	Page #	Account	Cell Ref.
NAEM Indy. Advertising Awareness - TST-1	G40	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - TST-1	D20
NAEM Indy. Advertising Awareness - TST-2	G41	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - TST-2	D21
NAEM Indy. Advertising Awareness - TST-3	G42	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - TST-3	D22
NAEM Indy. Advertising Awareness - CVE-1	G43	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - CVE-1	E20
NAEM Indy. Advertising Awareness - CVE-2	G44	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - CVE-2	E21
NAEM Indy. Advertising Awareness - CVE-3	G45	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - CVE-3	E22
NAEM Indy. Advertising Awareness - SSL-1	G46	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - SSL-1	F20
NAEM Indy. Advertising Awareness - SSL-2	G47	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - SSL-2	F21
NAEM Indy. Advertising Awareness - SSL-3	G48	from ==>	NAEM Bulletin 1	16	Indy. Advertising Awareness Index - SSL-3	F22
Company Advertising Awareness - TST-1	H40	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - TST-1	D12
Company Advertising Awareness - TST-2	H41	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - TST-2	D13
Company Advertising Awareness - TST-3	H42	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - TST-3	D14
Company Advertising Awareness - CVE-1	H43	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - CVE-1	E12
Company Advertising Awareness - CVE-2	H44	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - CVE-2	E13
Company Advertising Awareness - CVE-3	H45	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - CVE-3	E14
Company Advertising Awareness - SSL-1	H46	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - SSL-1	F12
Company Advertising Awareness - SSL-2	H47	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - SSL-2	F13
Company Advertising Awareness - SSL-3	H48	from ==>	NAEM Bulletin 1	16	Company Advertising Awareness Index - SSL-3	F14

Excel worksheet (tab), page number in the Excel-version of the COMPETE results printout, and cell references for each account are shown in the COMPETE Results Workbook table (on the right). The corresponding cell references for each account are shown in the Efficiency Analysis Worksheet table (on the left) in each of the Data Extraction Tables.

For instance, in the "Data Extraction Table for Efficiency Analysis Worksheet (Revenue & Advertising)" worksheet (see exhibit 7), the Combined "Sales Revenue for Company 1" in cell B10 on the "Efficiency Analysis Worksheet" (see exhibit 1) is extracted from cell G29 in the "Dollar Sales by Region by Company" table on the "Quality, Dollar Sales" worksheet of the COMPETE results workbook "Period.xls". Similarly, the "TST - Region 1 price for Company 1" in cell B20 on the "Efficiency Analysis Worksheet" (see exhibit 1) is extracted from cell D32 in the "Actual Price By Product By Region By Company" table on the "Forecast, Prices" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 8). In addition, the "Region 1 Advertising – Company 1" in cell B11 on the "Efficiency Analysis Worksheet" (see exhibit 1) is first extracted from cells E10, F10, G10, H10, I10, J10, K10, L10 and M10 in the "Advertising Expenditures By Medium By Product By Region By Company (In Millions)" table on the "Full Ad, Content" worksheet of the COMPETE results workbook "Period.xls". These advertising expenditures (in millions) are then added together and multiplied by 1,000,000 (see exhibit 7).

In addition, in the "Data Extraction Table for Efficiency Analysis Worksheet (Price)" (see exhibit 8), the "CVE - Region 2 price for Company 2" in cell C24 on the "Efficiency Analysis Worksheet" (see exhibit 1) is extracted from cell H33 in the "Actual Price By Product By Region By Company" table on the "Forecast, Prices" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 8).

Further, in the "Data Extraction Table for Efficiency Analysis Worksheet (SBU Advertising)" (see exhibit 9), the TST-Region 1 Advertising Budget for Company 1 in cell B30 on the "Efficiency Analysis Worksheet" (see exhibit 1) is extracted from cells E10 (BC media), F10 (PRT media), and G10 (SP media) in the "Advertising Expenditures By Medium By Product By Region By Company (in Millions)" table on the "Full Ad., Content" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 9). These extracted BC, PRT and SP media expenditures are summed together and multiplied by 1,000,000 in cell B30 of the "Efficiency Analysis worksheet" (see exhibit 1). In addition, the TST-Region 1 Company Advertising Awareness Index in cell H40 on the "Efficiency Analysis Worksheet (see exhibit 1) is extracted from cell D12 in the "Company Advertising Awareness Index By

EXHIBIT 11
DATA EXTRACTION TABLE FOR EFFICIENCY ANALYSIS WORKSHEET (SALESFORCE)

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (Salesforce Determinants)

COMPETE Efficiency Analysis Worksheet			COMPETE Results Workbook Period.xls			
Account	Cell		Worksheet (Tab)	Page #	Account	Cell Ref.
Company Salesforce - Company 1	B49	from ==>	Salesforce, Salaries	10	Combined Salesforce Size - Company 1	G19
Region 1 Salesforce - Company 1	B50	from ==>	Salesforce, Salaries	10	Region 1 Salesforce Size - Company 1	D19
Region 2 Salesforce - Company 1	B51	from ==>	Salesforce, Salaries	10	Region 2 Salesforce Size - Company 1	E19
Region 3 Salesforce - Company 1	B52	from ==>	Salesforce, Salaries	10	Region 3 Salesforce Size - Company 1	F19
Salesforce Salary - Company 1	B53	from ==>	Salesforce, Salaries	10	Salesforce Salary - Company 1	F35
Salesforce Commission - Company 1	B54	from ==>	Salesforce, Salaries	10	Salesforce Commission Rate - Company 1	E35
Company Salesforce - Company 2	C49	from ==>	Salesforce, Salaries	10	Combined Salesforce Size - Company 2	G20
Region 1 Salesforce - Company 2	C50	from ==>	Salesforce, Salaries	10	Region 1 Salesforce Size - Company 2	D20
Region 2 Salesforce - Company 2	C51	from ==>	Salesforce, Salaries	10	Region 2 Salesforce Size - Company 2	E20
Region 3 Salesforce - Company 2	C52	from ==>	Salesforce, Salaries	10	Region 3 Salesforce Size - Company 2	F20
Salesforce Salary - Company 2	C53	from ==>	Salesforce, Salaries	10	Salesforce Salary - Company 2	F36
Salesforce Commission - Company 2	C54	from ==>	Salesforce, Salaries	10	Salesforce Commission - Company 2	E36
Company Salesforce - Company 3	D49	from ==>	Salesforce, Salaries	10	Combined Salesforce Size - Company 3	G21
Region 1 Salesforce - Company 3	D50	from ==>	Salesforce, Salaries	10	Region 1 Salesforce Size - Company 3	D21
Region 2 Salesforce - Company 3	D51	from ==>	Salesforce, Salaries	10	Region 2 Salesforce Size - Company 3	E21
Region 3 Salesforce - Company 3	D52	from ==>	Salesforce, Salaries	10	Region 3 Salesforce Size - Company 3	F21
Salesforce Salary - Company 3	D53	from ==>	Salesforce, Salaries	10	Salesforce Salary - Company 3	F37
Salesforce Commission - Company 3	D54	from ==>	Salesforce, Salaries	10	Salesforce Commission - Company 3	E37
Company Salesforce - Company 4	E49	from ==>	Salesforce, Salaries	10	Combined Salesforce Size - Company 4	G22
Region 1 Salesforce - Company 4	E50	from ==>	Salesforce, Salaries	10	Region 1 Salesforce Size - Company 4	D22
Region 2 Salesforce - Company 4	E51	from ==>	Salesforce, Salaries	10	Region 2 Salesforce Size - Company 4	E22
Region 3 Salesforce - Company 4	E52	from ==>	Salesforce, Salaries	10	Region 3 Salesforce Size - Company 4	F22
Salesforce Salary - Company 4	E53	from ==>	Salesforce, Salaries	10	Salesforce Salary - Company 4	F38
Salesforce Commission - Company 4	E54	from ==>	Salesforce, Salaries	10	Salesforce Commission - Company 4	E38
Company Salesforce - Company 5	F49	from ==>	Salesforce, Salaries	10	Combined Salesforce Size - Company 5	G23
Region 1 Salesforce - Company 5	F50	from ==>	Salesforce, Salaries	10	Region 1 Salesforce Size - Company 5	D23
Region 2 Salesforce - Company 5	F51	from ==>	Salesforce, Salaries	10	Region 2 Salesforce Size - Company 5	E23
Region 3 Salesforce - Company 5	F52	from ==>	Salesforce, Salaries	10	Region 3 Salesforce Size - Company 5	F23
Salesforce Salary - Company 5	F53	from ==>	Salesforce, Salaries	10	Salesforce Salary - Company 5	F39
Salesforce Commission - Company 5	F54	from ==>	Salesforce, Salaries	10	Salesforce Commission - Company 5	E39

Product" table on the "NAEM Bulletin 1" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 10).

Then, in the "Data Extraction Table for Efficiency Analysis Worksheet (SBU Advertising Awareness)" (see exhibit 10), the TST-Region 1 Industry Advertising Awareness Index in cell G40 on the "Efficiency Analysis Worksheet" (see exhibit 2) is extracted from cell D20 in the "Company Advertising Awareness Index By Product" table on the "NAEM Bulletin 1" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 10). The TST-Region 1 Industry Advertising Awareness Index is used as a benchmark to assess the TST-Region 1 Company Advertising Awareness Index in cell H40 on the "Efficiency Analysis Worksheet" (see exhibit 2), which is extracted from cell D12 in the "Company Advertising Awareness Index By Product" table on the "NAEM Bulletin 1" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 10).

Next, in the "Data Extraction Table for Efficiency Analysis Worksheet (Salesforce)" (see exhibit 11), the Company Salesforce Total for Company 1 in cell B49 on the "Efficiency Analysis Worksheet" (see exhibit 2) is extracted from cell G19 in the "Salesforce Size By Region By Company – End of Period" table on the "Salesforce, Salaries" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 11). The Region 2 Salesforce for Company 2 in cell C51 on the "Efficiency Analysis Worksheet" (see exhibit 2) is extracted from cell E20 in the "Salesforce Size By Region By Company – End of Period" table on the "Salesforce, Salaries" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 11). The Salesforce Salary for Company 3 in cell D54 on the "Efficiency Analysis Worksheet" (see exhibit 1) is extracted from cell F37 in the "Commission Rate and Salary By Company" table on the "Salesforce, Salaries" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 11). Lastly, the Salesforce Commission for Company 4 in cell E54 on the "Efficiency Analysis Worksheet" (see exhibit 2) is extracted from cell E38 in the "Commission Rate and Salary By Company" table on the "Salesforce, Salaries" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 11).

Further, in the "Data Extraction Table for Efficiency Analysis Worksheet (Quality & Cost)" (see exhibit 12), the TST Quality – Company 1 in cell B56 (see exhibit 2) on the "Efficiency Analysis Worksheet" (see exhibit 1) is extracted from cell F9 in the "Period Quality Index By Company By Product" table on the "Quality, Dollar Sales" worksheet of the COMPETE results workbook Period.xls (see exhibit 12). The NAEM Industry Average TST Quality in cell G56 of the "Efficiency Analysis Worksheet" (see exhibit 2) is extracted from cell F10 in the "Product Quality Report" on the "Quality, Cost, OT, Shipments" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 12). The NAEM Industry Average TST Quality is used as a benchmark to assess the Company TST Quality Index in cell H56 on the "Efficiency Analysis Worksheet" (see exhibit 2), which is extracted from cell E10 in the "Product Quality Report" table on the "Quality, Cost, OT, Shipments" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 12).

Finally, in the "Data Extraction Table for Efficiency Analysis Worksheet (Quality & Cost)" (see exhibit 12), the NAEM

EXHIBIT 12
DATA EXTRACTION TABLE FOR EFFICIENCY ANALYSIS WORKSHEET (QUALITY & COST)

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (Quality & Cost Determinants)						
COMPETE Efficiency Analysis Worksheet			**COMPETE Results Workbook Period.xls**			
Account	**Cell**		**Worksheet (Tab)**	**Page #**	**Account**	**Cell Ref.**
TST Quality - Company 1	B56	from ==>	Quality, Dollar Sales	14	TST Quality Index - Company 1	F9
TST Quality - Company 2	C56	from ==>	Quality, Dollar Sales	14	TST Quality Index - Company 2	F10
TST Quality - Company 3	D56	from ==>	Quality, Dollar Sales	14	TST Quality Index - Company 3	F11
TST Quality - Company 4	E56	from ==>	Quality, Dollar Sales	14	TST Quality Index - Company 4	F12
TST Quality - Company 5	F56	from ==>	Quality, Dollar Sales	14	TST Quality Index - Company 5	F13
CVE Quality - Company 1	B57	from ==>	Quality, Dollar Sales	14	CVE Quality Index - Company 1	F14
CVE Quality - Company 2	C57	from ==>	Quality, Dollar Sales	14	CVE Quality Index - Company 2	F15
CVE Quality - Company 3	D57	from ==>	Quality, Dollar Sales	14	CVE Quality Index - Company 3	F16
CVE Quality - Company 4	E57	from ==>	Quality, Dollar Sales	14	CVE Quality Index - Company 4	F17
CVE Quality - Company 5	F57	from ==>	Quality, Dollar Sales	14	CVE Quality Index - Company 5	F18
SSL Quality - Company 1	B58	from ==>	Quality, Dollar Sales	14	SSL Quality Index - Company 1	F19
SSL Quality - Company 2	C58	from ==>	Quality, Dollar Sales	14	SSL Quality Index - Company 2	F20
SSL Quality - Company 3	D58	from ==>	Quality, Dollar Sales	14	SSL Quality Index - Company 3	F21
SSL Quality - Company 4	E58	from ==>	Quality, Dollar Sales	14	SSL Quality Index - Company 4	F22
SSL Quality - Company 5	F58	from ==>	Quality, Dollar Sales	14	SSL Quality Index - Company 5	F23
NAEM Indy. Average TST Quality	G56	from ==>	Quality, Cost, OT, Sh	7	NAEM Indy, Avg. TST Quality Index	F10
Company TST Quality	H56	from ==>	Quality, Cost, OT, Sh	7	Company TST Quality Index	E10
NAEM Indy. Average CVE Quality	G57	from ==>	Quality, Cost, OT, Sh	7	NAEM Indy, Avg. CVE Quality Index	F11
Company CVE Quality	H57	from ==>	Quality, Cost, OT, Sh	7	Company CVE Quality Index	E11
NAEM Indy. Average SSL Quality	G58	from ==>	Quality, Cost, OT, Sh	7	NAEM Indy, Avg. SSL Quality Index	F12
Company SSL Quality	H58	from ==>	Quality, Cost, OT, Sh	7	Company SSL Quality Index	E12
NAEM Indy. Average TST Cost of Production	G60	from ==>	Quality, Cost, OT, Sh	7	NAEM Indy, Avg. TST Cost of Production	J10
Company TST Cost of Production	H60	from ==>	Quality, Cost, OT, Sh	7	Company TST Cost of Production	I10
NAEM Indy. Average CVE Cost of Production	G61	from ==>	Quality, Cost, OT, Sh	7	NAEM Indy, Avg. TST Cost of Production	J11
Company CVE Cost of Production	H61	from ==>	Quality, Cost, OT, Sh	7	Company TST Cost of Production	I11
NAEM Indy. Average SSL Cost of Production	G62	from ==>	Quality, Cost, OT, Sh	7	NAEM Indy, Avg. TST Cost of Production	J12
Company SSL Cost of Production	H62	from ==>	Quality, Cost, OT, Sh	7	Company TST Cost of Production	I12

Industry Average TST Cost of Production in cell G60 of the "Efficiency Analysis Worksheet" (see exhibit 2) is extracted from cell J10 in the "Product Cost Report" on the "Quality, Cost, OT, Shipments" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 12). The NAEM Industry Average TST Cost of Production is used as a benchmark to assess the Company TST Cost of Production in cell H60 on the "Efficiency Analysis Worksheet" (see exhibit 2), which is extracted from cell I10 in the "Product Cost Report" table on the "Quality, Cost, OT, Shipments" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 12).

In order to assess the Sales-to-Advertising ratio by SBU, the "Efficiency by SBU Analysis Worksheet" extracts the price and unit sales of each of the nine SBUs, and then calculates the sales revenue of each of the nine SBUs. For instance, in the "Data Extraction Table for Efficiency by SBU Analysis Worksheet" (see exhibit 13), the TST-1 Price for Company 1 in cell B11 of the "Efficiency by SBU Analysis Worksheet" (see exhibit 3) is extracted from cell D32 in the "Actual Price By Product By Region By

EXHIBIT 13
DATA EXTRACTION TABLE FOR EFFICIENCY BY SBU ANALYSIS WORKSHEET

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (SBU Price Determinants)

COMPETE Eff by SBU Analysis Worksheet			COMPETE Results Workbook Period.xls			
Account	Cell		Worksheet (Tab)	Page #	Account	Cell Ref.
TST-1 Price - Company 1	B11	from ==>	Forecast, Prices	9	TST-1 Price - Company 1	D32
TST-2 Price - Company 1	B12	from ==>	Forecast, Prices	9	TST-2 Price - Company 1	G32
TST-3 Price - Company 1	B13	from ==>	Forecast, Prices	9	TST-3 Price - Company 1	J32
CVE-1 Price - Company 1	B14	from ==>	Forecast, Prices	9	CVE-1 Price - Company 1	E32
CVE-2 Price - Company 1	B15	from ==>	Forecast, Prices	9	CVE-2 Price - Company 1	H32
CVE-3 Price - Company 1	B16	from ==>	Forecast, Prices	9	CVE-3 Price - Company 1	K32
SSL-1 Price - Company 1	B17	from ==>	Forecast, Prices	9	SSL-1 Price - Company 1	F32
SSL-2 Price - Company 1	B18	from ==>	Forecast, Prices	9	SSL-2 Price - Company 1	I32
SSL-3 Price - Company 1	B19	from ==>	Forecast, Prices	9	SSL-3 Price - Company 1	K32
TST-1 Price - Company 2	C11	from ==>	Forecast, Prices	9	TST-1 Price - Company 2	D33
TST-2 Price - Company 2	C12	from ==>	Forecast, Prices	9	TST-2 Price - Company 2	G33
TST-3 Price - Company 2	C13	from ==>	Forecast, Prices	9	TST-3 Price - Company 2	J33
CVE-1 Price - Company 2	C14	from ==>	Forecast, Prices	9	CVE-1 Price - Company 2	E33
CVE-2 Price - Company 2	C15	from ==>	Forecast, Prices	9	CVE-2 Price - Company 2	H33
CVE-3 Price - Company 2	C16	from ==>	Forecast, Prices	9	CVE-3 Price - Company 2	K33
SSL-1 Price - Company 2	C17	from ==>	Forecast, Prices	9	SSL-1 Price - Company 2	F33
SSL-2 Price - Company 2	C18	from ==>	Forecast, Prices	9	SSL-2 Price - Company 2	I33
SSL-3 Price - Company 2	C19	from ==>	Forecast, Prices	9	SSL-3 Price - Company 2	K33
TST-1 Price - Company 3	D11	from ==>	Forecast, Prices	9	TST-1 Price - Company 3	D34
TST-2 Price - Company 3	D12	from ==>	Forecast, Prices	9	TST-2 Price - Company 3	G34
TST-3 Price - Company 3	D13	from ==>	Forecast, Prices	9	TST-3 Price - Company 3	J34
CVE-1 Price - Company 3	D14	from ==>	Forecast, Prices	9	CVE-1 Price - Company 3	E34
CVE-2 Price - Company 3	D15	from ==>	Forecast, Prices	9	CVE-2 Price - Company 3	H34
CVE-3 Price - Company 3	D16	from ==>	Forecast, Prices	9	CVE-3 Price - Company 3	K34
SSL-1 Price - Company 3	D17	from ==>	Forecast, Prices	9	SSL-1 Price - Company 3	F34
SSL-2 Price - Company 3	D18	from ==>	Forecast, Prices	9	SSL-2 Price - Company 3	I34
SSL-3 Price - Company 3	D19	from ==>	Forecast, Prices	9	SSL-3 Price - Company 3	K34
TST-1 Price - Company 4	E11	from ==>	Forecast, Prices	9	TST-1 Price - Company 4	D35
TST-2 Price - Company 4	E12	from ==>	Forecast, Prices	9	TST-2 Price - Company 4	G35
TST-3 Price - Company 4	E13	from ==>	Forecast, Prices	9	TST-3 Price - Company 4	J35
CVE-1 Price - Company 4	E14	from ==>	Forecast, Prices	9	CVE-1 Price - Company 4	E35
CVE-2 Price - Company 4	E15	from ==>	Forecast, Prices	9	CVE-2 Price - Company 4	H35
CVE-3 Price - Company 4	E16	from ==>	Forecast, Prices	9	CVE-3 Price - Company 4	K35
SSL-1 Price - Company 4	E17	from ==>	Forecast, Prices	9	SSL-1 Price - Company 4	F35
SSL-2 Price - Company 4	E18	from ==>	Forecast, Prices	9	SSL-2 Price - Company 4	I35
SSL-3 Price - Company 4	E19	from ==>	Forecast, Prices	9	SSL-3 Price - Company 4	K35
TST-1 Price - Company 5	F11	from ==>	Forecast, Prices	9	TST-1 Price - Company 5	D35
TST-2 Price - Company 5	F12	from ==>	Forecast, Prices	9	TST-2 Price - Company 5	G36
TST-3 Price - Company 5	F13	from ==>	Forecast, Prices	9	TST-3 Price - Company 5	J36
CVE-1 Price - Company 5	F14	from ==>	Forecast, Prices	9	CVE-1 Price - Company 5	E36
CVE-2 Price - Company 5	F15	from ==>	Forecast, Prices	9	CVE-2 Price - Company 5	H36
CVE-3 Price - Company 5	F16	from ==>	Forecast, Prices	9	CVE-3 Price - Company 5	K36
SSL-1 Price - Company 5	F17	from ==>	Forecast, Prices	9	SSL-1 Price - Company 5	F36
SSL-2 Price - Company 5	F18	from ==>	Forecast, Prices	9	SSL-2 Price - Company 5	I36
SSL-3 Price - Company 5	F19	from ==>	Forecast, Prices	9	SSL-3 Price - Company 5	K36

Company" table on the "Forecast, Prices" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 13).

Similarly, in the "Data Extraction Table for Efficiency by SBU Analysis Worksheet" (see exhibit 14), the Actual TST-1 Unit Sales for Company 1 in cell B21 of the "Efficiency by SBU Analysis Worksheet" (see exhibit 3) is extracted from cell D10 in the "Unit Sales By Product By Region" table on the "Unit Sales" worksheet of the COMPETE results workbook "Period.xls" (see exhibit 13). The price of each of SBU is multiplied by its unit sales to yield the SBU Sales Revenue (see exhibit 3). Finally, the SBU sales revenue is divided by the extracted SBU advertising media budget to yield the Sales-to-Advertising ratio for each of the nine SBUs (see exhibit 4).

In summary, the "Efficiency Analysis" worksheet extracts the company-wide sales revenue and advertising media budgets as well as the antecedents of both sales (the numerator) and advertising (the denominator) in order to facilitate assessment of the sales-to-advertising ratio at the company level. The "Efficiency by SBU Analysis" worksheet extracts and computes the SBU sales

EXHIBIT 14
DATA EXTRACTION TABLE FOR EFFICIENCY BY SBU ANALYSIS WORKSHEET

Data Extraction from COMPETE Results Workbook Period.xls To Efficiency Analysis Worksheet (SBU Unit Sales Determinants)

| COMPETE Eff by SBU Analysis Worksheet | | | COMPETE Results Workbook Period.xls | | | |
Account	Cell		Worksheet (Tab)	Page #	Account	Cell Ref.
TST-1 Actual Unit Sales - Company 1	B21	from ==>	Market Share	13	ctual Unit Sales - Co	D10
TST-2 Actual Unit Sales - Company 1	B22	from ==>	Market Share	13	ctual Unit Sales - Co	D20
TST-3 Actual Unit Sales - Company 1	B23	from ==>	Market Share	13	ctual Unit Sales - Co	D30
CVE-1 Actual Unit Sales - Company 1	B24	from ==>	Market Share	13	ctual Unit Sales - Co	F10
CVE-2 Actual Unit Sales - Company 1	B25	from ==>	Market Share	13	ctual Unit Sales - Co	F20
CVE-3 Actual Unit Sales - Company 1	B26	from ==>	Market Share	13	ctual Unit Sales - Co	F30
SSL-1 Actual Unit Sales - Company 1	B27	from ==>	Market Share	13	ctual Unit Sales - Co	H10
SSL-2 Actual Unit Sales - Company 1	B28	from ==>	Market Share	13	ctual Unit Sales - Co	H20
SSL-3 Actual Unit Sales - Company 1	B29	from ==>	Market Share	13	ctual Unit Sales - Co	H30
TST-1 Actual Unit Sales - Company 2	C21	from ==>	Market Share	13	ctual Unit Sales - Co	D11
TST-2 Actual Unit Sales - Company 2	C22	from ==>	Market Share	13	ctual Unit Sales - Co	D21
TST-3 Actual Unit Sales - Company 2	C23	from ==>	Market Share	13	ctual Unit Sales - Co	D31
CVE-1 Actual Unit Sales - Company 2	C24	from ==>	Market Share	13	ctual Unit Sales - Co	F11
CVE-2 Actual Unit Sales - Company 2	C25	from ==>	Market Share	13	ctual Unit Sales - Co	F21
CVE-3 Actual Unit Sales - Company 2	C26	from ==>	Market Share	13	ctual Unit Sales - Co	F31
SSL-1 Actual Unit Sales - Company 2	C27	from ==>	Market Share	13	ctual Unit Sales - Co	H11
SSL-2 Actual Unit Sales - Company 2	C28	from ==>	Market Share	13	ctual Unit Sales - Co	H21
SSL-3 Actual Unit Sales - Company 2	C29	from ==>	Market Share	13	ctual Unit Sales - Co	H31
TST-1 Actual Unit Sales - Company 3	D21	from ==>	Market Share	13	ctual Unit Sales - Co	D12
TST-2 Actual Unit Sales - Company 3	D22	from ==>	Market Share	13	ctual Unit Sales - Co	D22
TST-3 Actual Unit Sales - Company 3	D23	from ==>	Market Share	13	ctual Unit Sales - Co	D32
CVE-1 Actual Unit Sales - Company 3	D24	from ==>	Market Share	13	ctual Unit Sales - Co	F12
CVE-2 Actual Unit Sales - Company 3	D25	from ==>	Market Share	13	ctual Unit Sales - Co	F22
CVE-3 Actual Unit Sales - Company 3	D26	from ==>	Market Share	13	ctual Unit Sales - Co	F32
SSL-1 Actual Unit Sales - Company 3	D27	from ==>	Market Share	13	ctual Unit Sales - Co	H12
SSL-2 Actual Unit Sales - Company 3	D28	from ==>	Market Share	13	ctual Unit Sales - Co	H22
SSL-3 Actual Unit Sales - Company 3	D29	from ==>	Market Share	13	ctual Unit Sales - Co	H32
TST-1 Actual Unit Sales - Company 4	E21	from ==>	Market Share	13	ctual Unit Sales - Co	D13
TST-2 Actual Unit Sales - Company 4	E22	from ==>	Market Share	13	ctual Unit Sales - Co	D23
TST-3 Actual Unit Sales - Company 4	E23	from ==>	Market Share	13	ctual Unit Sales - Co	D33
CVE-1 Actual Unit Sales - Company 4	E24	from ==>	Market Share	13	ctual Unit Sales - Co	F13
CVE-2 Actual Unit Sales - Company 4	E25	from ==>	Market Share	13	ctual Unit Sales - Co	F23
CVE-3 Actual Unit Sales - Company 4	E26	from ==>	Market Share	13	ctual Unit Sales - Co	F33
SSL-1 Actual Unit Sales - Company 4	E27	from ==>	Market Share	13	ctual Unit Sales - Co	H13
SSL-2 Actual Unit Sales - Company 4	E28	from ==>	Market Share	13	ctual Unit Sales - Co	H23
SSL-3 Actual Unit Sales - Company 4	E29	from ==>	Market Share	13	ctual Unit Sales - Co	H33
TST-1 Actual Unit Sales - Company 5	F21	from ==>	Market Share	13	ctual Unit Sales - Co	D14
TST-2 Actual Unit Sales - Company 5	F22	from ==>	Market Share	13	ctual Unit Sales - Co	D24
TST-3 Actual Unit Sales - Company 5	F23	from ==>	Market Share	13	ctual Unit Sales - Co	D34
CVE-1 Actual Unit Sales - Company 5	F24	from ==>	Market Share	13	ctual Unit Sales - Co	F14
CVE-2 Actual Unit Sales - Company 5	F25	from ==>	Market Share	13	ctual Unit Sales - Co	F24
CVE-3 Actual Unit Sales - Company 5	F26	from ==>	Market Share	13	ctual Unit Sales - Co	F34
SSL-1 Actual Unit Sales - Company 5	F27	from ==>	Market Share	13	ctual Unit Sales - Co	H14
SSL-2 Actual Unit Sales - Company 5	F28	from ==>	Market Share	13	ctual Unit Sales - Co	H24
SSL-3 Actual Unit Sales - Company 5	F29	from ==>	Market Share	13	ctual Unit Sales - Co	H34

revenue and advertising media budgets as well as the antecedents of sales and advertising in order to facilitate assessment of the sales -to-advertising ratio of each SBU.

Both the "Efficiency Analysis" and "Efficiency by SBU Analysis" worksheets focus user attention on relevant information that have an impact on both the sales revenue and advertising expenditures for a specific period. Based on the extracted and calculated information on company sales revenue performance and advertising expenditures the two worksheets are able to calculate and present the Sales-to-Advertising ratio for the company as a whole as well as the Sales-to-Advertising ratio for each of the nine SBUs. The extracted data on the antecedents of both sales revenue and advertising at both the company and SBU level can be used to understand the reasons for sub-par sales-to-advertising ratio performance and to take corrective action in order to improve marketing effectiveness and efficiency.

EFFICIENCY ANALYSIS PACKAGE USE

The Web-based Efficiency Analysis Package is accessible online to competing participant teams in the marketing simulation COMPETE. The Web-based Efficiency Analysis Package is a zipped folder "Performance Efficiency.zip" that consists of one program file "Efficiency.xls" and one COMPETE result file "Period.xls" for a specific period. The Excel workbook file "Efficiency.xls" consists of two worksheets "Efficiency" (see exhibits 1 & 2) and "Efficiency by SBU" (see exhibits 3 & 4). Each of these two worksheets has external links to the Excel version of a specific COMPETE result (output) file "Period.xls".

The updated "Efficiency" and "Efficiency by SBU" worksheets in the "Efficiency.xls" workbook are used to monitor and assess the sales-to-advertising ratio performance and to understand the primary reasons for below par sales-to-advertising ratio during any specific decision period (quarter). The user can assess each of the primary determinants of sales revenue and advertising expenditures on the sales-to-advertising ratio for the company as a whole and for each of the nine SBUs. Each of the two Efficiency Analysis worksheets can be used in a similar manner to monitor the sales-to-advertising ratio relative to competitors and to understand the primary reasons for low or high sales-to-advertising ratio during a specific decision period (quarter).

First, the user can assess sales revenue and total advertising expenditures at the company level for the assessment period. In addition, the user can assess the primary determinants of sales revenue such as price, advertising budget, advertising awareness index, salesforce size by region, salesforce salary, salesforce commission, quality by product and cost of production by product. The product quality indices can be compared to the corresponding competitor quality indices as well as NAEM (trade association) industry averages. The advertising awareness indices and cost of production by product can be compared to the corresponding NAEM industry averages.

Next, the user can assess the sales revenue and total advertising expenditures for each of the nine SBUs for the assessment period. Further, the user can assess the primary determinants of sales revenue such as price, unit sales, advertising media expenditures, and advertising awareness index of each SBU as well as salesforce size by region, salesforce salary, salesforce commission, quality by product and cost of production by product. The product quality indices can be compared to the corresponding competitor quality indices as well as NAEM (trade association) industry averages. The advertising awareness indices and cost of production by product can be compared to the corresponding NAEM industry averages (see exhibits 5 & 6).

EFFICENCY ANALYSIS PACKAGE PROCESS

First, the user downloads and unzips the "Performance Efficiency.zip" folder. Next, the user logs in to CODES and downloads, renames and saves the Excel version of the results for a specific decision period (quarter) as "Period.xls" in the unzipped "C:\Performance Efficiency" directory. Then, the user opens and updates the "Efficiency.xls" workbook and selects either (a) the "Efficiency" worksheet (see exhibits 1 & 2) to analyze the sales-to-advertising ratio at the company level, or (b) the "Efficiency by SBU" worksheet (see exhibits 3 &4) to analyze the sales-to-advertising ratio at the SBU level.

For example, the executives of one of the five competing participant teams TriniTech 391 (Company 3) have used the Efficiency Analysis package to analyze the relatively low Sales-to-Advertising ratio of their company no. 2 in period 6 of the competition at the company level. The Efficiency worksheet (see exhibit 1) indicates that their company sales-to-advertising ratio of 15.85 is lower than three of their competitors (companies 3, 4 & 5). This low sales-to-advertising ratio is a result of their marginally higher $40.1 million sales revenue and a significantly larger $2.53 million advertising expense. Next, they explore why their largest $2.53 million advertising expense did not result in a commensurately higher level of sales.

First, the executives explore the quality or effectiveness of their advertising effort (the denominator of the sales-to-advertising ratio). Their advertising awareness indices for seven of the nine SBUs appear to be at or above the competitor levels. The advertising awareness index (on a scale from 92 "the pits", to 100 "par", to 108 "tops") indicates the effectiveness of their media and copy emphasis for each SBU. Their heavy advertising expenditure and reasonably good advertising effectiveness (as indicated by their advertising awareness indices) indicates that the problem lies elsewhere.

Next, their attention turns to the primary determinants of sales revenue (the numerator of the sales-to-advertising ratio) which include price, advertising budget and effectiveness, salesforce size, salary, and commission, and quality by product. Five of their nine SBU prices are above the computer industry average. Given that the COMPETE simulation uses a rational-man model,

ceteris paribus (all other things held constant), the lower the price, the higher the level of resulting sales.

Then, their attention turns to salesforce size and compensation. Their total salesforce size of 101 is substantially lower than the industry average of 107. Two competitors, companies 4 and 5 have salesforce sizes of 117 and 112 respectively. Their salesforce salary of $4000 is lower than the industry average salary of $4057, and their salesforce commission rate of 2.8% is higher than the industry average commission of 2.4%. Apparently, the executives of TriniTech decided to place more emphasis on pull v push relative to their competitors.

Finally, their attention turns to quality. The quality indices of their TST (102) and CVE (101) products are lower than the corresponding industry average indices of 102.4 and 101.2 as well as two of their competitors (companies 3 and 5) for the TST and company 5 for the CVE.

In summary, TriniTech executives can use the "Efficiency Analysis" worksheet to identify the reasons for their low sales-to-advertising ratio as a heavy advertising expenditure $2.53 million of moderate effectiveness resulting in marginally higher $40.1 million sales revenue relative to competition. The primary reasons for the lower than expected sales are: (a) higher than average prices for five of their nine SBUs, (b) lower than average quality for two of their three products, (c) a relatively weak salesforce size of 101, and (d) a lower than average salesforce salary of $4000. Armed with this insight, they are able to modify their marketing strategy and adjust the elements of the marketing mix in order to achieve better marketing effectiveness and efficiency as reflected in a higher sales-to-advertising ratio.

At the SBU level, the executives of TriniTech can use the "Efficiency by SBU Analysis" worksheet to identify the SBUs in their SBU portfolio with lower than average sales-to-advertising ratios and investigate the reasons for their below-par performance. For instance, TriniTech executives can see that eight of their nine SBUs have lower than industry average sales-to advertising ratio averages. Only the CVE in Region 3 has a sales-to-advertising ratio of 20.10 that is higher than the industry average sales-to-advertising ratio of 18.96. Many of the other SBUs have sales-to-advertising ratios that are substantially below the corresponding industry average sales-to-advertising ratios (see exhibits 3 & 4). The executives can investigate the determinants of advertising effectiveness and sales revenue using a similar approach as used at the company level, identify the underlying reasons for below par marketing effectiveness and efficiency for each of their SBUs, and take corrective action.

An illustration of the use of the Efficiency Analysis Package by team 4 in an end-of-semester team presentation clearly demonstrates that the low sales-to-advertising ratio in period 6 is due to higher price with same quality, highest advertising expense, low advertising awareness index indicating poor advertising media and message (copy) emphasis, and weak sales force (see exhibit 15). Team members analyze accurate, timely and relevant data that are extracted from the simulation results and presented to them for further analysis and decision-making. The sections of the one-hour team presentation indicated in the running agenda at the top

EXHIBIT 15
USAGE OF EFFICIENCY ANALYSIS PACKAGE IN
END-OF-SEMESTER TEAM PRESENTATION

of the illustration (each PowerPoint slide) include Introduction, Performance, Errors Made & Lessons Learned, Sales Forecasting (Multiple Regression analysis), Strategic Analysis, Positioning, Product Portfolio Analysis, and Evaluation & Control Mechanisms (see exhibit 15).

In summary, competing participant teams use the Efficiency Analysis Package to (a) monitor the sales-to-advertising ratio for the company and for each of their nine SBUs, (b) identify instances of below par performance, (c) assess the determinants of both advertising effectiveness and sales revenue, (d) understand the reasons for below-par sales-to-advertising ratio performance, and (e) take corrective action in order to improve marketing effectiveness and efficiency and exercise marketing control.

STRENGTHS AND LIMITATIONS

Marketing effectiveness and efficiency analysis can help management (a) identify instances when sales-to-advertising ratio of the company or one or more of their nine SBUs is below average, (b) determine the primary underlying causes for lower than expected sales resulting from higher than average advertising expenditures, and (c) take corrective action in order to improve marketing effectiveness and efficiency thereby increasing marketing ROI. The Efficiency Analysis package enables managers to assess whether the advertising effort is both effective and efficient by assessing the advertising budget and the effectiveness of the media and copy emphasis for each of the nine SBUs. In addition, this web-based package enables managers to monitor and identify the underlying determinants of sales revenue such as price, advertising media budget, copy emphasis, salesforce size, salary and commission, as well as product quality. After users identify the SBUs with lower than average sales-to-advertising ratio, understand the primary reasons for lower than average sales resulting from higher than average advertising expenses, they can use the insight derived to take corrective action.

Positive anecdotal student feedback was received from undergraduate students at the end of the Spring 2017 semester. Some undergraduate students reported that the decision support packages were very useful and helpful in understanding the determinants of sales-to-advertising ratio and understanding the concepts of marketing effectiveness and efficiency. They indicated that the automatic extraction feature saved time, especially since the Efficiency Analysis package does not require any data entry. All the relevant performance-based data are automatically extracted via external linking from the Excel version of the COMPETE results for a specific decision period.

The Efficiency Analysis Package has some limitations. First, the National Association of Electronics Manufacturers trade association welcomes new corporate members during the first decision period, and informs them that industry and market data will be provided from the second period. Accordingly, some of the relevant data are not reported in the first decision period and hence cannot be extracted by the Efficiency Analysis Package from the COMPETE results printout for the first decision period. These data include (a) the Industry Average Quality for each product in the Product Quality Report, and (b) the Company and Industry Advertising Awareness Indices for each of the nine SBUs in the NAEM Bulletin 2. In addition, if the firm does not order the necessary market research reports, the required information will be missing and not available for extraction from the Excel version of the COMPETE results files 1.xls, 2.xls, … , 12.xls. Since the primary objective is to learn about marketing strategy and decision making via usage of the various dss packages, all market research reports that provide data that are extracted via external linking are mandatory for all competing participant teams.

Perhaps, the most significant limitation is the absence of marketing ROI performance data on customer acquisition, customer engagement, customer experience, customer retention, customer loyalty, customer lifetime value, and customer equity in COMPETE and other marketing simulations. In addition, online advertising/marketing, use of social media, and marketing/ advertising/promotion ROI measures, which increase simulation realism and complexity, are absent in existing marketing simulations. As marketing simulation models include endogenous offline and online marketing decision variables as well as marketing ROI performance measures, they will increase in complexity. Marketing simulation participants will then be able to develop and use realistic integrated online and offline marketing strategies to market their offerings.

Despite these limitations, the Efficiency Analysis Package is a simple yet powerful web-based user-centered learning tool that extracts relevant data from the simulation results, precludes data entry error, and saves considerable time involved in identifying relevant data. Yet, in order to maximize learning about marketing effectiveness and efficiency and exercise marketing control via use of the Efficiency Analysis Package, the instructor needs to (a) explain the purpose, significance, assumptions, usage, and limitations of this dss package, (b) require inclusion of a sample analysis in a team report or presentation, and (c) test students on their understanding of the underlying concepts at the end of the semester.

CONCLUSION

The quest for customer-centric marketing ROI measures continues among leading marketing scholars and marketing simulation model builders. In the absence of customer-centric marketing ROI measures of marketing effectiveness and efficiency, the Web-based Efficiency Analysis Package is a user-centered learning tool that helps to prepare students for marketing decision-making responsibilities in their future careers. Participant teams use the Efficiency Analysis Package to (a) assess the sales-to-advertising ratio of the company and/or each of the nine SBUs in their SBU portfolio, (b) determine the reasons for sub-par marketing effectiveness and efficiency, (c) identify the underlying reasons for sub-par performance, and (d) take corrective action. This Web-based Efficiency Analysis Package facilitates the integration of computers, the Internet and the World Wide Web into the marketing curriculum.

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