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ONLINE CUMULATIVE SIMULATION TEAM PERFORMANCE PACKAGE

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ABSTRACT

The Online Cumulative Simulation Team Performance Package (developed jointly with David Walton) enables competing participant teams in the marketing simulation COMPETE to assess their cumulative team performance each period on 18 performance criteria. Participants with Web-access can determine their cumulative team ranking each decision period on six profitability, three market share, three quality, three cost of production, and three efficiency criteria. In addition, a comparative ranking of all teams on each of the above criteria can be made accessible online to all teams either every decision period (quarter), every six months, or every year of operation, based on participant preference.

INTRODUCTION

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 Excel version of their simulation output for each decision period. In addition to the team ranking on each of 18 performance criteria, a graphic team profile reveals at a glance where the teams need to focus their attention in order to improve performance. Based on this periodic performance feedback, the competing teams are able to (a) identify areas of relative strength and/or weakness, (b) operationalize the 90-10 (Iceberg) Principle (McCarthy & Perrault, 1984), (c) analyze the reasons for good performance or lack thereof, and (d) use the insight derived to either exploit new opportunities or take corrective action (Kotler, 2003; Aaker, 2005).

First, the existing literature on the topic of simulation performance and its relationship to learning is reviewed. Next, the marketing simulation COMPETE and online performance-enhancing tools currently available to competing participant teams are indicated. Then, COMPETE simulation performance output measures and the online cumulative simulation team performance package are described and illustrated. The concluding section acknowledges the limitations of this package and summarizes the benefits to participants.

LITERATURE REVIEW

Several studies have examined the relationship between grade point average (GPA) and simulation performance. Some studies have reported that higher GPA students performed better in simulation competitions (Hsu 1989; Wolfe and Keys, 1990; Wolfe and Channin, 1993). Other studies have reported no relationship between GPA and simulation performance (Faria, 1986; Gosenpud, 1987; Gosenpud and Washbush, 1991; Norris and Niebuhr, 1980; Wellington and Faria, 1995).

Another group of studies have examined the relationship between learning (measured by final examination performance) and simulation performance. Again, some studies have reported a relationship between performance on mathematical problems and simulation performance (Faria and Whiteley, 1990; Whiteley and Faria, 1989). Other studies have reported no relationship between course final examination performance and simulation performance (Anderson and Lawton, 1992; Washbush and Gosenpud, 1993; Wellington and Faria, 1991; Whiteley, 1993).

These results suggest that simulation game performance (generally measured at the team level) and learning (measured by final examination performance at the individual level) may measure different constructs. In addition, the unit of analysis in typical course settings may differ.

Simulation performance measures reported in recent studies include earnings, profitability ratios and stock price (Hornaday and Ensley, 2000); profit, market share, return on sales, return on assets, return on equity, asset turnover, and stock price (Kickul, 2001); net sales revenue and net profits (Anderson and Lawton, 2002); 20 performance measures including market share, sales growth, sales, unit production costs, cash flow balance, current liquidity ratio, debt to asset ratio, return on equity and net profit margin (Bernard, 2004); and net income, return on assets and return on sales (Gosen and Washbush, 2001). The range of simulation performance measures currently in use may explain some of the differences in findings.

This paper presents an "Online Cumulative Simulation Team Performance Package" that can facilitate learning through simulation by improving the quality of the feedback that students receive. The intent here is to convey to simulation participants that team performance is multivariate rather than univariate in nature. Despite the complex multivariate nature of overall team performance, the competing participant teams are provided with a single

(though simplistic) composite overall measure of performance.

THE MARKETING SIMULATION COMPETE

COMPETE (Faria, Nulsen, & Roussos, 1994) is a widely used 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 consumer electronic products in three regions within the United States. 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. Next, specific, measurable, quantifiable, time-bound, challenging yet realistic and consistent goals are set. Then, marketing strategies are formulated to achieve these goals. Later, a tactical marketing plan is devised for each strategic business unit (SBU) and the individual SBU marketing plans are consolidated into a company-wide marketing program (McCarthy & Perreault, 1984).

Constant monitoring and analysis of their own and competitive performance helps the teams better understand their markets and improve their decisions. In this regard the Iceberg (90-10) Principle reminds them that superficial analyses of the balance sheet and income statement are inadequate. Detailed analysis of each SBU's contribution to the profitability of the company is necessary to determine if there are any underlying problems that need to be addressed before the company, like the Titanic, strikes an iceberg and sinks (McCarthy & Perrault, 1984).

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 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 research and development (R&D) decisions, and three 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.

ONLINE PERFORMANCE-ENHANCING TOOLS

The competing participant teams are provided with several online strategic market planning, positioning, sales forecast model-building and performance analysis packages. They use the web-based Boston Consulting Group (BCG) Graphics Package (Palia, De Ryck & Mak, 2002) in Strategic Market Planning in order to decide the level of investment and individual strategies for each of the SBUs in their brand portfolio and to allocate resources among the nine SBUs (Aaker 2005). In addition, they use the web-based Product Positioning Map Graphics Package (Palia, De Ryck, & Mak, 2003) together with sample Values & Lifestyle Analysis (VALS) psychographic data in order to position their brands relative to competing brands. Later, they use the Multiple Regression Analysis Data Matrices Package (Palia, 2004) to build a linear, unrestricted, single-equation, multiple regression model to forecast the sales of each SBU. Finally, they use a wide array of web-based Excel worksheets to make shipment decisions, conduct scenario analysis, profit contribution analysis of each of their nine SBUs, sales, cost and margin analysis for each SBU, as well as cash flow, balance sheet ratio, breakeven, and time series analyses.

SIMULATION PERFORMANCE OUTPUT

Each participant can access the COMPETE Online Decision Entry System (CODES) (Palia, Mak, & Roussos, 2000; Palia & Mak, 2001) and download (print) a substantive text printout of approximately nine to sixteen pages. This quarterly printout of the simulation results for each decision period consists of a message center, balance sheet, income statement, three regional income contribution statements, potential and actual market share (by SBU) report, quality report, cost report, overtime report, shipment and inventory report, earnings per share report, market share by product report, sales force activity report, and selected optional market research reports including an informative Trade Association Report).

The comprehensive simulation output provides each participant with sufficient detail to analyze the performance of their area of responsibility within the organization. Based on the organizational structure (functional, geographic, divisional, market, committee, matrix, or hybrid) selected, the individual managers can use one or more of the analytical tools and graphics packages provided to assess their own performance within the firm. Yet, the approximately 16-page performance output does not provide an overall measure of team performance.

In order to provide the competing participant teams with feedback on their overall performance, a simplistic schema based on rankings was devised. First, nine Excel worksheets were developed to keep track of team performance on balance sheet accounts, cost of production, earnings per share, efficiency, industry effort index, market

share, profitability, and quality over the course of the simulation competition.

Next, eighteen measures of performance are selected to provide teams with feedback on overall performance. These include six profitability, three market share, three quality, three cost of production, and three efficiency measures. Six measures of profitability are selected since one of the tenets of marketing is long-term profitability (Kotler, 2003; McCarthy & Perreault, 1984; Perreault & McCarthy, 1996). These measures are Earnings per Share (EPS is an overall measure of company profitability), Return on Total Assets (ROTA measures how well the assets are used to generate profits), Net Profit Margin (NPM measures how profitable the sales are), Sales to Asset Turnover (SATO measures how well the assets are used to generate sales), Return on Equity (ROE measures how well the equity is used to generate profits), and Retained Income (a cumulative measure of profits). The three market share, quality, and cost-of production measures of performance are by product. Finally, the three Efficiency measures include Sales-to-Advertising Ratio, Sales-to-Sales force Expense Ratio, and Sales-to-Promotional Expense Ratio.

Then, measures of overall simulation performance are derived for each measure. For example the EPS and market share by product performance is reported in and taken directly from the simulation printout. ROTA, NPM, SATO, and ROE are calculated over the duration of the simulation competition. Retained Income is taken directly from the balance sheet for the final period of competition. Quality and cost of production are taken for the period subsequent to the final period of competition in order to preclude end-of-game strategy.

Later, the teams are ranked on their overall simulation performance on each of the 18 performance criteria. Assuming a five-team industry, the number of first ranks are multiplied by the smallest weight of 1, the number of second ranks by a weight of 2, the number of third ranks by 3, the number of fourth ranks by 4, and the number of fifth ranks by 5. A dominant team with 1st ranks on all 18 performance attributes would earn a cumulative score of 18x1=18. Consequently, the teams with the lowest overall weighted rank score are deemed to be the best overall performers on all 18 performance criteria.

CUMULATIVE SIMULATION TEAM PERFORMANCE

An Excel-based macro program is used to convert the entire original DOS-text COMPETE simulation output into an Excel workbook. This facilitates direct analysis of the simulation results without having to re-enter the relevant DOS-text data into Excel worksheets for subsequent analysis. Substantial time savings are realized by (a) the competing teams during analysis of team performance, and (b) the administrator when tracking team performance. In addition, potential keystroke error is precluded.

Conversion of the DOS-text simulation output into an Excel workbook yields additional benefits. First, internal and external links between worksheets in the same Excel workbook can be used to access the required data in order to calculate each teams ROTA, NPM, SATO, ROE, Sales-to-Advertising, Sales-to-Sales force Expense, and Sales-to-Promotional Expense ratios. Next, a Visual Basic program is used to provide each team with their rank on each performance measure, the graphic team performance profile, a cumulative team score, and an overall ranking on all 18 performance measures. Then, a liquidity check is made of the Short Term Notes Payable (STNP is the amount of debt incurred based on a Sources and Uses of Cash statement) account in the balance sheet. If a team's STNP exceeds $1 million at the end of comp-etition, the team is deemed to be bankrupt and the overall ranking is adjusted downward (see Figure 1).

Based on participant preference, a comparative ranking of all teams on each of the 18 performance criteria as well as their overall ranking can be made accessible online to all teams every decision period (quarter), every six months, every year of operation, midway through the competition, or only at the end of competition (see Figure 2). While the teams derive additional insights about their competitors (similar to Company Annual Reports), they yield valuable information about their own relative strengths and weaknesses to their competitors. Accordingly, a conscious (consensus) choice in this regard is made by all teams at the beginning of competition.

LIMITATIONS

While profitability (6 measures) is weighted more heavily than market share, quality, cost, and efficiency (3 measures each) in order to satisfy the marketing tenet of long-term profitability, the weightings are arbitrary. An improved performance evaluation paradigm may permit teams to assign relative weights to each of the performance criteria, based on the strategy selected. For instance, a team that uses a brand differentiation strategy may assign heavier weights to profitability and quality criteria. Yet, such a schema is likely to increase the difficulty of administering the simulation and evaluating inter-team performance.

Further, the overall team performance scores are calculated based on relative rankings (not absolute measures) on each performance attribute. Consequently, the Online Simulation Team Performance Package does not discriminate between a team in one industry that ranks second by a 0.1% market share difference from another team that ranks second by a 20% market share difference. As in simulation design, a conscious trade-off has been made on the 'schema simplicity'-'performance realism' continuum.

CONCLUSION

The Online Cumulative Simulation Team Performance Package enables competing participant teams in the COMPETE simulation to assess their cumulative team performance each period on 18 performance criteria. Participants with Web-access can determine their cumulative team ranking each decision period on six profitability, three market share, three quality, three cost of production, and three efficiency criteria. Based on participant preference, a comparative ranking of all teams on each of the above criteria can be made accessible online to all teams either every decision period (quarter), every six months, or every year of operation. This package facilitates the operationalization of the Iceberg Principle and the integration of computers, the Internet and the World Wide Web into the marketing curriculum.

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FIGURE 1

Industry M - Company 2 - Period 1
Definity

Cumulative Performance Ranking & Profile

		Rank				
		1	**2**	**3**	**4**	**5**
1	Earnings per Share (EPS)		X			
2	Return on Total Assets (ROTA)		X			
3	Return on Equity (ROE)		X			
4	Return on Sales (NPM)		X			
5	Asset Turnover (SATO)		X			
6	Retained Earnings		X			
7	Market Share – TST		X			
8	Market Share – CVE	X				
9	Market Share – SSL		X			
19	Quality Index – TST			X		
11	Quality Index – CVE	X				
12	Quality Index – SSL	X				
13	Cost of Production - TST	X				
14	Cost of Production - CVE	X				
15	Cost of Production - SSL		X			
16	Sales / Advertising Expense Ratio	X				
17	Sales / Salesforce Expense Ratio		X			
18	Sales / Promotional Expense Ratio	X				
	Frequency	7	10	1	0	0
		×	×	×	×	×
	Weight	1	2	3	4	5
		=	=	=	=	=
	Score	7	20	3	0	0

Cumulative Score	30
Performance Rank	1
Bankrupt?	No
Adjusted Rank	1

FIGURE 2

EMBA XIV - BUS 615b
Industry M - Period 12
Cumulative Team Performance Ranking
Team Comparison

	Team 1	Team 2	Team 3	Team 4
EPS	4	1	2	3
ROTA	4	1	2	3
ROE	4	1	2	3
NPM	4	1	3	2
SATO	1	4	2	3
Retained Earnings	4	1	2	3
Market Share – TST	3	2	1	4
Market Share – CVE	4	3	1	2
Market Share – SSL	2	1	3	4
Quality Index – TST	4	1	1	1
Quality Index – CVE	1	1	1	4
Quality Index – SSL	2	2	4	1
Cost of Production – TST	2	4	1	3
Cost of Production – CVE	3	4	1	2
Cost of Production – SSL	3	1	4	2
Sales / Advertising Expense Ratio	2	3	1	4
Sales / Salesforce Expense Ratio	4	1	2	3
Sales / Promotional Expense Ratio	3	1	2	4
Score	54	33	35	51
Performance Rank	4	1	2	3
Bankrupt?	No	No	No	No
Adjusted Rank	4	1	2	3