

**MUSINGS ON BUSINESS GAME PERFORMANCE EVALUATION**

Hans B. Thorelli, Indiana University

**ABSTRACT**

In special-purpose business games as well as in numerous simple general management games, a single indicator is often appropriate for evaluating the performance of participating teams. Typically, but far from always, the nature of the performance indicator is fairly self-evident, though its ultimate rationale may be relatively weak. In more complex functional game and especially in intricate general management simulations, the need for multimeasurement grows, perhaps even faster than the complexity itself. This becomes especially evident in games that permit truly entrepreneurial decisions, with concomitant variation in philosophy, scope, and scale of individual companies.

**INTRODUCTION**

Many business games designers and users believe that a single measure should be used to evaluate team performance. Analogous to gauging the temperature of water in a pool, it certainly simplifies score-keeping! Assuming that students have been alerted in advance, the single- (measurement)-minded would also claim that clinging to a single scale has an inherent element of fairness: whether participants agree with the measure or not, they "know what the score is." Just like in a horse race, there would generally be no doubt that about the winner. And, indeed, a majority of games are as simple in concept as horse races; thus, a "unimeasure" may be quite justified. In such cases, inherent logic will often make the specification of the measure fairly obvious.

Regardless of how performance is being measured, an important question is always whether the assessment will reflect a better understanding of the "reality" being simulated, or whether it merely reflects superior ability in "beating the game." Unless the issues in the game are narrowly defined, and fairly "technical" in nature, the risk is substantial that the score mirrors understanding of the game model rather than the richness of reality.

Neoclassical economists might say that a good, single performance measure is the stock price of a company. This is a contentious assertion. Stock price does not

have the merit of a single gauge, but it is dependant on a host of independent variables, such as dividend to earnings ratio, growth in sales, market share, profitability, riskiness, and future prospects. Clearly, some of these variables are difficult to define unambiguously-not to speak of the difficulty and/or complexity of measuring them. Further, the relative weight to assign the component variables is essentially an arbitrary matter. In effect, stock price is actually a multidimensional measure, and one whose rationale in a given game model may be difficult to specify, let alone to make credible.

**COMPLEX GAMES MAKE FOR COMPLEX EVALUATIONS**

A growing group of overall strategy and other general management simulations are characterized by increasing complexity. As every Wall Street analyst knows, complexity calls for consideration of a portfolio of indicators. Different analysts tend to favor different criteria or mixes thereof. A seemingly legitimate hypothesis is that as complexity grows, the need for multiple indicators grows exponentially. Our initial concern will be quantitative factors, later turning to qualitative ones. Numerical measurements have the advantage of direct comparability. When in ratio (rather than absolute) form, they also have the merit of being "objective," that is, equally applicable to all companies.

**INTOPIA as an Example**

The International Operations Simulation/Mark 2000 (INTOPIA), representative of the class of complex integrated strategy exercises, will be used for illustrative purposes. Table 1 shows a number of activity indicators for the final period (8) of the first INTOPIA run at the American Graduate School of International Management (Thunderbird), Fall 1994. The word "activity" is used as presumably being more than comprehensive "performance." (The difference between the two is no doubt subjective.) Individual indicators used are defined in Figure 1. For single-minded instructors, we recommend ROI, as this traditional performance measure is still widely used. Too, its advantages as well as limitations are well understood.

**Table 1: Profitability Ratios and Activity Indicators in INTOPIA Runs**

	Co.2	Co.3	Co.4	Co.5	Co.6	Co.7	Co.8	Ind. Avg.
<b>PROFITABILITY RATIOS</b>								
ROS	22.1%	22.8%	22.2%	6.1%	-4.1%	28.3%	5.2%	14.6%
ROA	8.5%	18.8%	13.5%	2.4%	-2.5%	20.0%	3.0%	9.1%
ROE	12.2%	9.3%	20.1%	4.6%	-14.7%	13.5%	2.1%	6.7%
Gross Profit Margin	44.5%	81.1%	36.7%	23.3%	33.4%	75.1%	30.6%	46.4%
Net Profit Margin	8.6%	18.8%	17.1%	3.0%	-13.3%	20.6%	3.0%	8.1%
<b>ACTIVITY RATIOS</b>								
Cumulative Dividends (000s)	710	2425	1000	1200	0	3200	0	1712
Paid in Capital	24	557	92	687	0	720	0	416
Current Dividend Payout Ratio	17.3%	20.8%	0%	37.8%	0%	20.8%	0%	13.7%
Investment Intensity	74.5%	202.4%	119.5%	106.2%	227.9%	157.4%	142.3%	147.2%
Fixed Asset Intensity	21.2%	90.1%	13.2%	0%	43.2%	72.6%	29.1%	38.5%
Advertising Intensity	2.2%	0%	0%	1.9%	6.3%	0%	3.1%	1.9%
R&D Intensity	1.0%	2.8%	0%	0%	4.8%	1.9%	2.6%	1.9%
X Patents Owned (Grade)	0	8	0	0	0	8	0	
Y Patents Owned (Grade)	5	0	3	0	4	0	5	
<b>LIQUIDITY MEASURES</b>								
Current Ratio	144.8%	355.4%	238.6%	164.3%	229.6%	229.4%	208.6%	224.4%
Quick Ratio	71.5%	295.7%	161.6%	72.3%	93.8%	172.0%	72.7%	134.2%
Inventory/Net Working Capital	163.6%	23.3%	55.6%	143.0%	104.8%	44.3%	125.2%	94.3%
<b>LEVERAGE RATIOS</b>								
Debt to Asset Ratio	63.5	17.9	53.0	75.4	75.4	29.4	42.3	51.0
Debt to Equity Ratio	174.1	22.6	122.0	306.8	307.1	43.1	73.3	149.9
Long Term Debt/Equity Ratio	5.4	0	32.0	59.2	150.4	0	0	35.3
<b>CONSUMER MARKET SHARES (Sales in Units)</b>								
World Market Share of X	0	0	0	100	0	0	0	
World Market Share of Y	35.6	0	0	43.4	10.3	0	10.8	
Area 1 Market Share of X	0	0	0	100	0	0	0	
Area 1 Market Share of Y	0	0	0	59.4	8.3	0	32.4	

Area 2 and 3 market share data excluded for space reasons. Table 1 type data available for fee in any Period of a run

**Figure 1: Formulas Used for Ratio and Activity Indicators in Table 1**

<b>PROFITABILITY RATIOS</b>		
1	ROI	=Gross Earnings/(Total Assets - Total Current Liability)
2	ROS	=Gross Earnings/Total Sales (A)
3	ROA	=Gross Earnings/Total Assets
4	ROE	=Net Earnings/Total Equity
5	Gross Profit Margin	=Total Gross Margin/Total Sales (A)
6	Net Profit Margin	=Net Earnings/Total Sales (A)
<b>ACTIVITY INDICATORS</b>		
7	Cum. Dividends (000s)	=Cumulative Dividends/1000
8	Paid in Capital (000s)	=Paid in Capital/1000
9	CurrDividend Payout Ratio	=Current Q Dividends/Previous Q Net Earnings
10	Investment Intensity	=(Total Assets - Total Current Liability)/Total Sales (A)
11	Fixed Asset Intensity	=(Total Assets - Total Current Assets)/Total Sales (A)
12	R&D Intensity	=(R&D Expense Chips + R&D Expense Pcs)/Total Sales (A)
13	X Patents Owned	=Maximum Owned Grade X
14	Y Patents Owned	=Maximum Owned Grade y
<b>LIQUIDITY MEASURES</b>		
15	Current Ratio	=Total Current Assets/Total Current Liability
16	Quick Ratio	=(Total Current Assets - Total Inventory)/Total Current Liability
17	Invtry/Netwrking Capital	=Total Inventory/(Total Current Asstes - Total Current Liability)
<b>LEVERAGE RATIOS</b>		
18	Debt to Asset Ratio	=Total Liability/Total Assets
19	Debt to Equity Ratio	=Total Liability/Total Equity
20	LngTrm Debt/Equity Ratio	=(Total Liability - Total Current Liability)/Total Equity
<b>MARKET POSITION RATIOS</b>		
21	WrldCnsmrMrktShr X units	=Total Co Cnsmr Sales X Units/Industry Cnsmr Sales X Units (B)/(D)
22	WrldCnsmrMrktShr Y units	=Total Co Cnsmr Sales Y Units/Industry Cnsmr Sales Y Units (C)/(E)
23	CnsmrMrktShr X units US	=(Std+Dlx Cnsmr SlS US X Units)/Industry Cnsmr Sales X in US (F)
24	CnsmrMrktShr Y units US	=(Std+Dlx Cnsmr SlS US Y Units)/Industry Cnsmr Sales Y in US (G)
<b>INTERMEDIATE FORMULAS (Deleted here for space reasons)</b>		

Std=the standard model of a product, Dlx=the delux version

Letters within parenthesis refer to corresponding Intermediate Formulas

A few comments on the run as well as the data in the table seem desirable. Co. 1, run as monitor by the facilitator, represented a major Japanese competitor (Japan is not an operating area for participant teams). Hence, its data are excluded from the Industry Averages. Co. 4 was selling their entire output to Co. 5, which was a wholesaler. In this particular run, Co. 5 was the only company selling chips (product X) to the

consumer market, for upgrading or replacement purposes. Cos. 2 and 8 were both PC manufacturers, marketing all their output, or a significant part thereof, to the consumer market. Co. 6 was vertically integrated.

A glance at the cluster of profitability ratios

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indicates a relatively low correlation between individual companies, with the exception of component suppliers Cos. 3 and 7. These companies were in patent pools together. It is possible that their cooperation extended to pricing and other areas, although the facilitator was not aware of such behavior, nor were there any complaints from PC makers 2 and 8. The contrast on performance variables between the latter companies is striking. Although Co. 4 evidenced the highest ROE its operations were somewhat unexciting.

Despite its positive Gross Margin, Co. 6 is the only industry member running an unprofitable operation. Its great investment intensity provides a prime clue to this state of affairs (while also being a consequence thereof). Incidentally, the model does not discriminate against vertical integration.

Even superficial comparison of the disparate numbers now handful of profitability indicators strongly suggests that similar discrepancies occur in annual reports of publicly traded companies. Our criteria do not purport to be complete. However, they may be taken as applicable to any business. Our exercise above serves to emphasize that no single financial criterion is indisputable as representing company performance in complex environments.

### Action Potential May Well Be Number One

Philosophically, we believe that business is in business to stay in business, i.e. the modern corporation is not in business to earn profits; it earns profits to stay in business. This, in turn, means that action potential for the future overrides any single financial criterion in importance. While in part reflecting performance, the variables in the four categories below Profitability Ratios in Table I are primarily indicative of action potential for the future. Again, no claim is made for a complete set. By way of example, such a set would also include an appropriate size of inventory of marketable goods, and the presence of networks, each

favorable to all its members, i.e. viable standing supplier contracts, inter-company loans, patent pools, currency hedges, joint ventures. (All such standing arrangements are represented in INTOPIA.)

### COMPANY-SPECIFIC EVALUATION

Our remarks on action potential for the future is an example of how qualitative elements inescapably will blend with quantitative factors in any balanced approach to simulation exercises. Frequently, qualitative elements call for qualitative evaluation criteria. The challenge here is to keep subjective elements of evaluation within bounds. This will be illustrated in our discussion of evaluating companies on their own merits.

### Assumption: Each Company Has a Right to Be Evaluated on Its Own Merits

This assumption is a philosophical one, based on the notion that as individuals have a right to be evaluated not only on general criteria (such as age, IQ) but also on their own merits (degree to which their IQ, dreams, etc. have been realized), so do organizations. In other words, this is a *separate basis of evaluation*, distinct from the conventional general-criteria basis discussed earlier. It should be stated from the outset that this type of evaluations is a matter of personal style, practiced by the author. Such an “extra” evaluation is not a necessary part of INTOPIA operations-indeed, many users may well disagree with the approach on philosophical (or practical) grounds.

### Entrepreneurial Decisions

The yardstick needed for evaluating a company on its own terms is provided by the concept of the business, its objectives, and plans. To the author, the most crucial set of entrepreneurial decisions is those that define the nature (idea, concept, scope, domain) of the business. The exhaustive set of such dimensions consists of product (or service) made or sold, functions performed, clientele(s) served, territorial extension, and time. The set of opportunities available in INTOPIA is indicated in Figure 2.

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Co.A may be a maker of chips in the U.S. and of PCs in the EU, and a wholesaler of both products in Brazil, while serving PC makers with chips in the U.S. and EU, and marketing PCs to end consumers in EU through a captive sales organization. Chip making in the U.S. may begin in Quarter (Q) 2, PC manufacture in EU in Q3, and wholesaling in Brazil by Q4. As the illustration suggests, scores of business profiles are available from the beginning right through to the end of the simulation.

**Fig. 2: Entrepreneurial Opportunity in INTOPIA**

<i>Areas of Opportunity</i>	<i>Dimensions of Opportunity</i>
PRODUCT	Chips (X), Pcs (Y) each in ten variants
MODE	Producer, distributor, fully integrated co., subcontractor, financial, and/or research services
CLIENTELE	End consumers representing three different cultures, distributors, PC makers
AREA	Brazil, EC, U.S. Liechtenstein
TIME	Operations in one area (or product) may begin in one period, ops. in another area (product) in another.

Typically, companies have to select their (initial) niche within the default value of a uniform Swiss Francs 20 million starting capital (presumably supplied by venture capitalists). However, a facilitator wishing to expand the overall scope of entrepreneurial decision-making can do this by requiring companies to submit formal prospecti, and allocating starting capital according to their relative merit.

The concept of the business may be accompanied by a

statement of business philosophy (growth should be financed internally, stability vs. riskmindedness, innovation is our keynote, outsourcing of chips, etc.). An indispensable part of yardstick design is a statement of objectives, including quantification and schedule of major goals (Retained Earnings should be positive by Q5, regular dividend payments from Q6; by Q4 Co. should have at least 20 percent of the global PC market by revenue and by Q8 at least 25 percent, etc.). Clearly, the definition of objectives is ultimately a subjective matter-as is the business idea itself. However, various dimensions of objectives may nevertheless be objectively analyzed to a fair extent, as indicated by Figure 3 (taken from a handout to participants).

**Figure 3: Criteria for Eval. of Objectives**

1. Degree of Ambition
2. Actionability and Realism
3. Specificity
4. Creativity
5. Resolution of Inconsistencies
6. Synergy (internally & with partners)
7. Compatibility with company scope
8. Match with environmental opportunity
9. Match with company compatibility
10. Compatibility with company philosophy of risk
11. Appropriateness of time horizon (PLC, life of plants and standing contracts, etc.)
12. Supporting arguments

### Strategy Implementation: Plans

Implementation dynamics is a key feature distinguishing games from cases. A couple of quarters into the simulation, companies are assigned the preparation of their business plans for Q4-7. The criteria for the evaluation of plans are, in part, common with those used for objectives. However, the following criteria are added:

- Logic of ends and means
- Completeness
- Balance of short and long-term considerations
- Assumptions

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The evaluation of the company on its own merits is accomplished by laying the yardstick defined by its concept of the business, objectives and plans along its performance as evidenced by its own outputs and, to an appropriate extent, its adaptation to environmental events (such as strikes, trade regulation) and industry developments. Deviations (positive and negative) & noted by the facilitator, and will be further examined in the management audit of the company.

### Expected Performance vs. Actual

A comparative analysis of expected performance vs. actual may clearly be undertaken at almost any level of decision-making. This theme has been developed in detail by Richard Teach in his article on forecasting accuracy as a performance measure in business simulation (Teach., 1993). In INTOPIA, the ancillary CASH+ forecasting program provides a standard means of establishing expected performance at various levels of detail, such as sales by product, region, or at the global level, or cash flow forecasting on a regional, currency, and/or consolidated level. Actual performance is displayed by the quarterly company outputs.

Positive and negative deviations may be evaluated in conventional terms (were the deviations due to managerial action/inaction, or to “unforeseeable” environmental events, etc.).

### Inter-Company Audit (or Self-Review)

The last major assignment in my runs is a cross-company management audit focused on performance evaluation. It will typically take each company a couple of hours of preparation time. This time may be cut in half (or more) by each company undertaking a self-review, based on the self-defined yardstick and actual performance. Class discussion and evaluation of the quality of the presentation follows in either case.

The minimum checklist of items to be considered includes the objective-plans-implementation sequence, networking with other companies, reaction to world events, comparative analysis focused on the closest

competitors, evaluation of action potential, and, by way of conclusion, recommendations to a successor team of managers. Beyond the documentation of the focal company, sources available include consolidated financial statements for all companies for Q4 and Q8 (corresponding to annual reports), a listing of all standing contacts, current and back issues of the quarterly trade association journal, an Investor's Almanac summarizing the objectives of all companies separately, and the overview of industry profitability ratios and activity indicators (Table 1). Naturally, good audits/self-reviews may also be performed without these accoutrements.

The author has found it quite helpful to enlist the cooperation of INTOPIA participants in cross-company evaluation. The introductory part of the instrument is shown in Figure 4. The amounts invested are summed up for each company, and the companies are ranked by the “investments” received. Although it may be taken for granted that the evaluation criteria of the instructor are somewhat different, the rankings given by participants are generally (not always!) quite similar to those of the author.

As you retire, your Board is giving you a farewell contribution of SF100,000 to your retirement fund. You already have plenty of stock in your own company. The Board, believing in the wisdom of a balanced portfolio for retirement, requires that you invest your total gift in other companies in the industry, in the order you believe in them. (You are, of course, free to invest it all in one company.)  
Kindly record your investment below and return the form punctually. Thank You!

### EVALUATION OF INDIVIDUAL EXECUTIVES

Evaluation of individual participants is a different matter than the measurement of company performance. It is, however, closely related, and is often considered a vexing problem. The author

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uses a trifocal approach. First, early in the run participants take a test in INTOPIA "rules. This is justified, as executives in everyday life have to "learn the ropes" of any new job. Second, at midgame as well as endgame, the members of each executive team are asked to fill in a Group Analysis Form, evaluating other members of the team (and themselves) on 10 different criteria, using a scale of 1 to 10, or 1 to 20 on each. To minimize collusion and camaraderie effects, participants are told that forms with identical rankings on any single criterion will be disregarded if such identity occurs more than twice.

Participants are also reminded that as practicing executives they will be asked to evaluate the performance of close colleagues and subordinates.

Finally, two or three written individual assignments pertaining to planning and creativity and/or data analysis are required during a semester.

Thorelli, H., Graves, R., & Lopez, J-C (1995) *INTOPIA Executive Guide*. Englewood Cliffs, NJ: Prentice-Hall

Thorelli, H., & Lopez, J-C (1995) *INTOPIA Compendium for the Administrator* Englewood Cliffs, NJ: Prentice-Hall.

### Evaluation Criteria Ex Ante and Ex Post

The point has been made that evaluation criteria must be specified in advance of a run. This applies to qualitative as well as quantitative elements of performance. In addition, the author has found an important part of debriefing to be a discussion with participants of alternative performance criteria. Such a discussion can provide a valuable learning experience for instructor as well as participants.

### REFERENCES

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