Cash Management and Inventory Management as Company Performance Criteria in General Management Simulations

William D. Biggs
Arcadia University
biggs@arcadia.edu

ABSTRACT

This article argues that both cash management and inventory management can, and should, be used as criteria to evaluate company performance in general management simulations. These criteria are discussed, and an approach is suggested for using each of them.

INTRODUCTION

The Association for Business Simulations and Experiential Learning (ABSEL) has a long history of publishing articles related to evaluating company performance in general management simulations. One line of inquiry has addressed what types of company performance criteria should be used with profit, financials ratios, and stock price frequently being mentioned. The emphasis on these criteria in general management simulations is also evident from a review of three widely used simulations, which are designed for the senior-level capstone course. Micromatic (Anderson et al, 2019) uses seven performance criteria including profit, stock price, four others that are financials ratios and one measure which is more marketing related. The Business Policy Game (Cotter et al, 2017; Cotter and Fritzsche, 2016) provides two sets of criteria; however, one is a subset of the other so 17 variables are provided. These 17 variables include profit, three financial ratios, and stock price, as well as eight other measures that are financial, three that are marketing, and one that is production in nature. Capstone 2.0 (Capsim Management Simulations, 2020) uses a Balanced Scorecard approach with 18 variables identified (Kaplan and Norton, 1996). While the Balanced Scorecard groups the variables into four categories for comparison here, they have been identified as profit, stock price, six financial, six marketing and four operations. Table 1 lists the criteria for each of these simulations and indicates those that overlap among the simulations.

TABLE 1
Simulation Performance Criteria Comparison

	MICROMATIC	BPG Z Score	BPG Pro Score	Capstone 2.0
Sales in $	M	M	M	
Income after Taxes/Profits	F	F	F	F
Earnings per Share	F	F	F	
Return on Sales	F	F	F	
Return on Assets	F	F	F	
Return on Equity	F	F	F	
Stock Price	F	F	F	F
Market Share		M		
Total Equity		F		
Total Assets		F	F	
Fixed Assets		F	F	
Dividends/Share		F		
Sales/Assets		M		
Unit Production Costs		P		
Investor's ROI		F	F	
Interest Coverage		F		
Bonds/Equity		F		
Leverage				F
Customer Buying Criteria				M
Awareness				M
Accessibility				M
Product Count				M

SG&A Expense				F
Contribution Margin				F
Plant Utilization				P
Days of Working Capital				F
Stock-out Costs				M
Inventory Carrying Costs				F
Employee Turnover				P
Employee Productivity				P
Profits/Employee				F
Assets/Employee				F
Sales/Employee				M
Key: F = Financial; M = Marketing; P = Production/Operations				

This article argues that cash management and inventory management should be included as criteria when evaluating company performance in general management business simulations. It is also suggested that inventory management can be used as a proxy criterion for forecast accuracy, which is sometimes suggested as a criterion. The rationale for including both criteria is presented. The asymmetrical nature of these measures is discussed and an approach, which takes this into account, is provided.

CASH MANAGEMENT

While cash management is clearly financial in nature, it looks at a different aspect of company performance than that addressed by profit and financial ratios. The importance of cash management is evident from a U.S. Bank study, which found that "82 percent of business failures are due to poor cash flow management, or poor understanding of how cash flow contributes to business." NFIB (National Federation of Independent Business, 2020). Thus, cash management in general and cash flow, are part of cash management and is important if a company is to be successful. The company must ensure that it has sufficient cash receipts to cover its cash expenditures. If cash flow is not sufficient a company runs the risk of not being able to pay stakeholders such as employees, suppliers, and/or creditors. Failure to pay any of these stakeholders could result in company failure since employees might refuse to work, suppliers might refuse to provide the necessary raw materials, and creditors might call in or refuse to provide loans.

Such failure can occur even if the company is reporting a profit. Thus, profitability is not a sufficient criterion for evaluating company performance. It is also the case that insufficient cash flow could mean that the company is not able to pay dividends thereby failing to meet the needs of another group of stakeholders, the stockholders. So, while profits might be pushing the stock price higher, a lack of cash could be holding it back.

A search of The Bernie Keys Library (BKL), which contains the ABSEL proceedings was made for articles that contained the phrases, cash flow and cash management. There were quite a few articles that mention cash flow. These articles, however, tend to focus on describing the cash flow statement, noting its importance, citing issues, rather than discussing using cash flow as an evaluation criterion in general management simulations. There were four articles that mentioned cash management, one of which (Swanson, 1976) merely referred to using it as an evaluation criterion.

In general management simulations students can manage cash flow by generating cash inflows from operations that exceed cash outflows; through the issuance of stock and/or bonds, and/or by taking on short-term loans. If cash inflows exceed cash needs most general management simulations provide for investing in some type of securities, issuing dividends, paying off loans/bonds, or retiring stock.

In classroom settings, where general management simulations are used, instructors generally do not want a company to cease operations since this might disrupt the industry and, probably more importantly, since there would be issues related to how the students for that company would continue in the course and be graded. Simulations, including the three mentioned previously, typically help the user avoid the cash shortage issue by providing a firm supplemental funding, such as an emergency loan, which is sufficient to pay all the current obligations and bring the cash position to some predetermined amount, generally zero. These loans typically carry detrimental effects such as a remarkably high interest rate (e.g., 30% per annum) for those funds; a requirement that they be repaid in the next period, which may mean that additional funds are required quickly; and/or a poorer credit rating that results in higher interest rates on borrowing in subsequent periods of game play. Thus, it is clearly important to avoid cash shortages.

It is also the case; however, that a company could have too high a cash balance. In simulations that provide for investment in things such as Certificates of Deposit (CDs), one can raise questions when a firm has a large amount of cash and little to no investments that make use of the cash on hand that exceeds what is needed for operations. Beyond this one can question why the firm is not making capital expenditures to enhance future profits; making operational expenditures to improve items such as efficiency of production, market share, and/or reducing interest expense through debt reduction; enhancing employee well-being through increases in wages or other expenditures; and increasing investor's Return on Investment (ROI) through the payment of

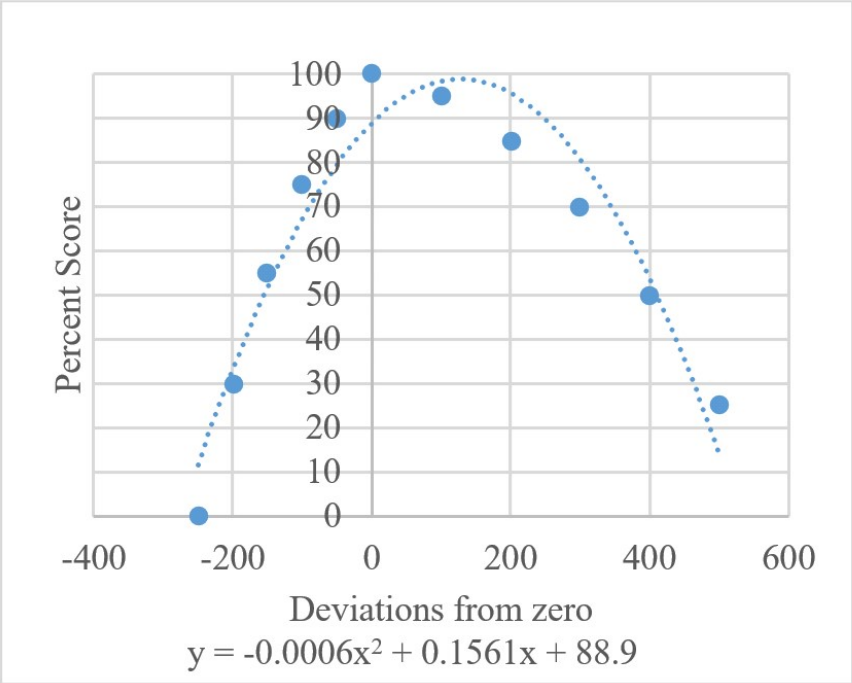
dividends. Thus, if a firm has a cash balance that appears to be excessive, they should also be penalized for poor cash management.

It seems reasonable that needing a special loan is a more critical problem than not using excess cash optimally. Both situations reflect poor planning, however, it is generally the case that the consequences of a cash shortage are greater than for a cash surplus. The evaluation of the cash position should reflect this lack of symmetry. The simulation designer could build in an equation based upon the key factors that would reflect good/poor cash management, considering the magnitude of the asset base used in the simulation (e.g., $10,000 verse $100,000, etc.). The hypothetical example presented in Table 2 and Figure 1 were created for cash surplus or cash shortage based upon the following assumptions and calculations:

TABLE 2
Cash Balance Deviation from Zero with Resulting % Score

Cash Balance Deviation from Zero	% Score
0	100
100	95
200	85
300	70
400	50
500	25
-50	90
-100	75
-150	55
-200	30
-250	0

FIGURE 1
Cash Deviation from Zero with Resulting % Score



1. The highest cash surplus would be $500, and the lowest cash shortage would be -$250.
2. The optimal cash balance would be where there were no special loans or idle cash so the cash balance would be zero which should result in a score of 100%.
3. The lowest score that could be receive was 0%.

4. A score of zero would be incurred if the negative deviation was 1/2 the positive deviation, which in this example is -$250 verse $500.
5. The percent decline for negative deviations would be more rapid than for positive deviations. In this example, a deviation from the optimum of zero of $100 results in a percentage score of 95% but -$50 yields a score of only 90%.

A number of comments are in order concerning this hypothetical example:

1. The values selected for high or low would need to be tailored to the simulation which would most likely involve using the data generated in the given period being analyzed.
2. The optimum value was to be zero, but one could easily argue that this is cutting it too close and that something other than zero should be used so that a firm does not get hurt by random events as opposed to poor decisions. It should also be noted that in the example provided the line fitted to the selected data points in fact results in a score of 100% rather than 95% with a positive deviation of $100.
3. The shape of the curve should be more dished shaped (flatter at the top) to reflect the fact that there may be a range plus or minus within which it might be reasonable to have a score of 100%. This would be another way to offset the impact of random events.
4. The lowest score was set at 0% but one could set at a higher value to reduce the impact of an extremely low score for this criterion. For example, score of 60% could be used to reflect a grade of D. This would also result in the other deviations being scored higher as well.

In addition to the magnitude of cash deviations, the frequency of cash shortages should be addressed. A firm which consistently receives funds due to a lack of planning should be penalized. In the International Collegiate Business Strategy Competition - ICBSC (Sparks, 2020), which uses the Business Policy Game (Cotter et al 2017), the evaluation criteria stipulate that any firm which incurs multiple emergency loans is not eligible for any of the awards. One merely must do a count to invoke this penalty. In a classroom situation the instructor would make an adjustment to the percent score.

It should be noted that there are other criteria one might argue could be used to evaluate cash management. For example, one could easily compare the working capital of each firm. There are at least two issues here. First, suppose there are two firms that are equal on all the components of working capital, but one borrows $100,000 which it holds as cash. In this case the working capital of the two firms will remain the same but one firm clearly will have more cash than is necessary for operational needs and will incur interest expense. Second, working capital consists of several components so when component values differ for the two firms there is distortion due to the differences among the components. This second issue would also exist for any indirect composite type of measure. For example, the Current Ratio includes numerous components and involves division. A measure such as Return on Assets (ROA), which includes cash as a component, is even less direct as is evident from the DuPont ROA Model. This model, even in a simplistic form, contains 10 components, some of which are themselves composite measures, and involves addition, subtraction, multiplication, and division as one moves through the four steps needed to calculate ROA.

INVENTORY MANAGEMENT

As Hayes (2019) notes, “Inventory management refers to the process of ordering, storing and using a company's inventory. This includes the management of raw materials, components and finished products, as well as warehousing and processing such items.” Inventory management provides another instance of the need for asymmetrical analysis if it is used to evaluate company performance in a general management simulation. If a firm has too little inventory it may be unable to meet customer demand and therefore incur stock outs while too much inventory results in storage costs due to excess finished goods inventory.

A search of The Bernie Keys Library (BKL) was made for articles that contained the phrases, inventory control and inventory management. There were quite a few articles that mentioned one or both phrases, however, they tended to focus on its importance or cited issues rather than using it as a company performance evaluation criterion in general management simulations. As was the case for cash management the Swanson (1976) article merely referred to using inventory management as an evaluation criterion.

In general management simulations there often are two types of inventory: (1) raw materials; and (2) finished goods. For raw materials, the amount ordered often involves decisions recognizing tradeoffs between carrying costs and quantity discounts. The focus here, however, is on finished goods, which students can manage by having “the right stock, at the right levels, in the right place, at the right time, and at the right cost as well as price.” (Intuit, 2020). This involves producing the correct amount and distributing the finished goods among the sales regions so that carrying costs and transportation costs are minimized while also avoiding stock outs. Since sales are to some extent a function of price that decision also influences inventory management. In addition, if profit is to be achieved, production costs must be managed.

In many simulations the cost of stock outs is quite high for a variety of reasons:

1. The firm loses the sales and therefore the revenue associated with those sales. It is also the case that the firm incurs the same marketing and finance expenses as it would have the higher number of units been sold so revenue has dropped but many expenses are unchanged. Thus, profitability is reduced.
2. The lost sales are even more problematic if the simulation reallocates the firm’s lost sales to other firms in the industry.

In this case not only has the firm lost the sales and profits, but the other firms, with no increase in marketing or financing expenses, generated more sales and profits than they would have otherwise.

3. The salespeople may become dissatisfied and quit because they generated the sales that were not filled and if there is a commission involved, they have lost income. Given that salespeople may have to be replaced, the firm will experience hiring costs. In addition, there is often a lag between when a salesperson is hired and when they become available resulting in a reduced salesforce. Added to the reduced sales force is a lack of proficiency caused by a steep learning curve for new salespeople, so they are less productive.

There are also costs associated with having too much inventory:

1. The firm will incur inventory carrying costs.
2. If the inventory is extremely high more costly storage options may be necessary.
3. Inventory ties up funds and in extreme cases the firm might need to take out loans and incur interest expense.

As with cash management the costs on the negative side are more consequential than those on the positive side. Thus, one would use a similar approach to that described and shown in Table 2 and Figure 1 for Cash Management. The deviation on the negative side would be stock outs and on the positive side the amount of finished goods inventory. The set of four comments shown for the hypothetical cash management example would also apply for inventory control.

As mentioned earlier inventory control related to finished goods can be used as a measure of forecast accuracy for performance in general management simulations. This is true since both stock outs and excessive finished goods inventory indicate the firm did not adequately predict potential sales. Given that both situations can result in decreased revenue and/or increased costs there are consequences for company performance. This is important since there is a line of ABSEL research that addresses forecast accuracy as an evaluation criterion in general management simulations. It is not the purpose of this article to evaluate the use of forecast accuracy, although the author would argue that it can and should be used, rather it is to suggest how inventory control can be used as a proxy criterion for forecast accuracy. For an excellent summary of ABSEL and other literature related to forecast accuracy the reader should see Pacheco de Souza et al (2010).

As was the case for cash management there are other criteria one might argue could be used to evaluate inventory management. For example, one could easily compare the inventory carrying costs of each firm. One problem here is that two firms could have identical carrying costs but one of them has inventory distributed across all regions, whereas the other has all the inventory in one region and has experienced stock outs in other regions. It is also the case that transportation expenses, which are directly related to inventory management, would differ between the firms. As was the case with cash management indirect composite measures, such as ROA, which includes inventory as part of the calculation, could cause distortions due to differences among the components.

CONCLUSION

The argument has been made for the use of cash management and inventory management as criteria to evaluate company performance in general management simulations. It was also suggested that inventory management of finished goods can be used as a proxy criterion for forecast accuracy. These criteria are supplemental and are not the only criteria.

In evaluating company performance in general management simulations there are many criteria issues to be considered, particularly when such items are being used to grade students. Listed below are some of these issues as well as the author's thoughts (biases?):

1. What criteria will be used? This should depend on the goals of the course and the instructor; however, there are three that in my view should always be included:

    a. Profit - The students are running a for-profit company and this needs to be recognized.
    b. Cash Management – As noted earlier many companies cease to exist due to poor cash management which makes this an important criterion.
    c. Forecasting – Failure to adequately forecast almost always results in poor performance for other criteria.

2. How many criteria will be used? For many years I would have argued for five to seven criteria; however, at this point I would argue for a Balanced Scorecard approach which would involve eight to twelve criteria so that there were two or three criteria in each of the four perspectives put forth by Kaplan and Norton (1996). I would also be inclined to treat the four perspectives as the four functional business areas of finance, marketing, operations, and human resources. The number of potential criteria in each of these areas is quite high. For example, Financial (profit, ratios, cash); Marketing (unit or dollar market share, warehousing, transportation, inventory turnover; operations (worker productivity, production efficiency; human resources (employee turnover, effectiveness of compensation reflected by sales/ salesperson). Creative students will come up with others, some which will be quite good and some which will be highly questionable.
3. Will the criteria be based upon an ordinal scale in which the instructor says something like the top firm receives 100 points, the 2nd team receives 90%, etc.? Or will a relational scale be used in which each firm's percent score is

calculated as a percent of the top performing firm for that variable? I would argue for a relational scale since this would reflect the magnitude of the differences among the companies.

4. Will the criteria be weighted? I would argue that that the criteria should be weighted but with restrictions set by the instructor. For example, no criteria could be less than 5% nor more than 20%, or a criterion, such as profit, had to be at least 10%.
5. Will the instructor or the students select the criteria and weights for each company? I would argue that the students should set the criteria and weights, based upon the strategy and goals/objectives of the firm. For example, using Porter's generic strategies (Porter, 1980) a firm following a cost leadership strategy would probably select unit market share as a criterion and weight it heavily, whereas a firm doing a product differentiation strategy would either not select unit market share at all or would not weight it heavily or might select dollar market share instead.
6. Can the criteria and/or weights be changes during the simulation? I would argue that the criteria could be reset and reweighted by the students each simulated year. If a strategy is not working, it makes sense to change and that likely means changing the performance criteria. We reward CEO's who successfully implement turnaround strategies so why wouldn't we do this in simulations? Perhaps, the profit measure here would be the magnitude of the change rather than the absolute profit achieved.

In the final analysis, however, we will want to assess, what is the most important aspect related to company performance evaluation in simulations, student learning! Have the students in fact acquired the desired Skills Knowledge and Abilities (SKA's)?

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