

Manitoba Research Institute

Game Guide

Young Entrepreneurs' Challenge



V2.0

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Overview

The Youth Entrepreneurs' Challenge is a business simulation in which participants can practice planning and decision making from the perspective of a top-level management position. The internal behavior and the external interactions of several competing firms in a hypothetical industry, provides a realistic simulation in which dynamic and practical business decision can be made. The simulated model, like the real world, is full of uncertainty.

The owners, or shareholders, of your company have hired your team to manage their investment. Your responsibility is to maximize the owner's return on their investment in the company. At the beginning of the game, each team starts at the same financial position with an equal proportion of the market share. Your position throughout the game will be judged by your ability to increase your shareholder's return on investment (ROI).

Each team operates its company to maximize ROI by making the following nine quarterly decisions:

1. Selling price of the firm's product
2. Marketing Budget
3. Scheduled production volume
4. Raw materials purchase budget
5. Plant maintenance budget
6. Research and development budget
7. Plant and equipment investment budget
8. Robotics investment budget
9. Dividend for distribution to shareholders

Decisions are made at simulated quarter year intervals, which apply to one quarter of operation. The system simulates the internal operations of each firm, their interactions with one another, and the way they are affected by the economy as a whole. The results of decisions are determined by a set of economic hypothesis and accounting assumptions. Teams must learn how the industry operates by observation and analysis of the results of each quarter.

The system prepares several reports for players: profit and loss statements (income statement); balance sheets; reports covering cash flow, sales volume, inventories, economic forecasts, limited information about competitors, and various other useful items. A quarterly set of reports is provided to each team as a basis for decisions for the following quarter of operation. Annual summary reports are also provided, giving additional information on competitors. The reports and their contents are explained later in this guide.

Getting Started

The important thing for teams to remember is that you are not judged by any set of rules. You will be judged on how your firm performs in comparison to other firms in the industry, more specifically by Return on Investment (ROI). You may feel a little overwhelmed by the material provided, but remember that all teams are facing the same circumstances. Decisions will become easier and quicker once you have a routine in place and become more familiar with the information. Remember that decisions will take longer at the beginning of the game. The sooner you get organized, the easier things will be.

Choose a leader for your firm (maybe rotate this position)

Duties of a leader:

- Ensure that the decisions are submitted on time. If your team fails to submit their decision by the scheduled date, the business quarter will be simulated using your last decision.
- Ensure that each team member has completed the duties assigned for each period.
- Ensure all members have read the information provided including the starting point for all groups.

Establish a strategic plan:

1. Establish goals & objectives that will accomplish the desired strategy:
 - Specifies what the firm is striving for, what it wants to achieve. It is highly desirable that targets be established which are measurable and quantifiable.
 - Goals & objectives such as: a certain market share, dividend payment target, growth rate and target ROI
2. Prepare an action plan that describes how the objectives will be accomplished
 - A detailed description of how the firm intends to achieve its objectives
3. Establish a control and feedback system to keep the organization on track with the strategic plan

The strategic plan should answer these questions:

- Where are we now?
- Where could we go - what could we do?
- What is the best thing for us to do?
- How are we going to do it? Who is going to do what parts?
- How are we going to measure our progress?

An example of a simple strategic plan:

Strategy:	To manufacture and market a high tech widget
One objective could be:	To attain a 20% market share in one year
An action plan to achieve this objective:	Increase our marketing effort by 25%

You must then decide in the short run how you intend to implement this strategy. Will the marketing effort be increased by 25% all at once, or will it be increased over 4 quarters. Whatever your strategy, you will need to measure it against what is actually happening and make any necessary revisions to your strategy.

A Worksheet is provided to help each group keep track of its decisions throughout the Game. Alternatively, a Worksheet may be used by each individual group member to plan their preferred course of action for the next decision, to be used as a starting point for discussion at Group meetings.

Please note that all information contained regarding strategies to get started are suggestions and are given only as a guide - you should modify them to suit your needs.

Guidelines for Making Decisions

This section provides you with some guidance in making your decisions, while keeping the ultimate goal in mind, the best ROI for your shareholders.

As in the real business world, an essential ingredient of successful management is balance and coordination among the various decisions. For example, efforts to increase sales must properly relate to the quantity of goods available for sale and also to production capacity. Investment and dividend policies have to be geared to both profits and cash flow. All of the numerous decisions must be made with reference to one another, as well as the competition and the prevailing economic conditions.

Remember that the decisions you make in the Game are all intertwined. To help illustrate this fact, key decision terms are in bold to help you see just how all of your decisions are affected by one another. Also keep in mind the decisions of other firms will affect the outcome of the decisions that you have chosen for your firm. To begin with:

1. Examine the results of the last quarter's operations (except in first quarter)
2. Compare actual results to your expectations
3. Discuss what went right/wrong in your previous analysis
4. Make your decisions

Selling Price

At the beginning of the Game, all firms are selling their product at the same price of \$25.60 per unit.

Price is an important determinant of a firm's share of the industry's total potential sales. To begin with in making your pricing decision, note your sales volume and profits at your last price (if available). Remember at high prices sales fall off sharply (no one wants to pay that much!) and with low prices sales increase (but keep in mind that too low a price may not cover the total cost per unit!)

General rules in the Game:

- A one percent increase in your price will tend to decrease your market potential by about 5 percent.
- A one percent increase in the average price of the other firms will tend to increase your market potential by about two percent.

In the Game to assure fair competition; a firm's minimum selling price cannot go below its adjusted standard cost of \$12 per unit (adjusted for inflation) and the maximum selling price permitted is \$36 per unit (adjusted for inflation). The simulation will automatically adjust any decisions that violate these limitations.

Questions to ask when determining the selling price are:

- What do you think the average industry price will be?
- Will your price be competitive considering your Research & Development, Robotics Investment and Marketing Budget?

Marketing Budget

Marketing budgets include the spending mainly for direct selling expenses (think of advertising etc.). Keep in mind the effects of these expenditures are dominant during the quarter when they are budgeted and diminish in following quarters. Other things being unchanged, to maintain a given level of marketing effectiveness it is necessary to increase marketing budgets in proportion to the general price index.

Your marketing budget is a very important determinant in fighting competition for your share of the market and to bring your product to the attention of the public. There is a balance you have to achieve.

For example:

- If you increase marketing and/or decrease your selling price, your market potential will go up, and vice versa.
- If your decisions are unchanged but your competitors increase marketing and/or decrease Selling Price, then the total industry market potential will go up.
 - However, this increase would be captured by your competitors and result in a net decrease in your own market potential.
- But - if you spend too much on marketing it can result in a less than proportional increase in sales

What is Market Potential?

Marketing budgets are used in conjunction with other decisions to capture a part of the market, your market potential. Market potential relates to the demand generated for your product in the previous period and is determined by economic conditions, seasonal fluctuations of demand for your product, general price levels, as well as industry wide interactions between the firms. All firms at period 0 have generated the same market potential.

The following discussion is quite technical and may or may not be helpful to you. However, it attempts to show the interaction between various factors and their impact on market potential. The following general relationships apply:

- 1% increase in the economic index will tend to increase your market potential by about 1.4%. This does hold over time however this analysis is independent of other factors affecting market potential
- 1% increase in the seasonal index will tend to increase your market potential by about 1%
- 1% increase in your Marketing Budget will tend to increase your market potential by about 0.25%.
- 1% decrease in the average Marketing Budget of the other firms will tend to decrease your market potential by about 0.1%. Changes in the opposite direction have the same effects of the same size

A few words of caution: the analysis results can only be assumed valid under the circumstances that prevailed at the beginning of the Game. As various factors change substantially, it is to be expected that the effects will be at least a little (or possibly a lot!) different from those specified above.

As stated earlier there are many individual factors that affect your market potential. You can approximate the effects of a whole pattern of small changes by adding up their individual effects. Suppose for instance, that you hypothesize that the economic index will increase by 2%, the seasonal index will decrease by 3%; that you will cut Selling Price by 2%, while other firms' average Selling Price will go down only 1%; and that you will cut your marketing budget by 6% (after first increasing it by 2% to keep up with inflation). Assume as well that, on average, your competitors will make no changes in marketing. The estimated effect on your market potential can then be estimated as follows:

Cause	Approximate impact	
Economic index up 2%	+2% x +1.4	2.8%
Seasonal index down 3%	-3% x +1.0	-3.0%
2% cut in your price	-2% x -5.0	10.0%
Average 1% cut in others' prices	-1% x +2.0	-2.0%
6% decrease in your marketing budget	-6% x +0.25	-1.5%
0% change in others' marketing budget	0	0.0%
Net impact on market potential	6.3%	

Remember, this is only an approximation based on statistical studies, thus the above calculations can at best lead to an estimate! You can expect it to become less and less accurate as circumstances change. It can be used to make predictions of how many units you can sell, depending on how you set your Selling Price and how much you budget for Marketing. Your market potential is more sensitive to your own decisions than the decisions of your competitors.

Most common errors in market potential forecasts will stem from bad guesses about what your competitors are going to do.

Scheduled Production Volume

In the beginning of the Game (period 0) all firms produce the same number of units, 100,000.

The production decision for subsequent periods is based on your market potential - How many units do I intend to sell?

It is important to have adequate production to meet customer demand. Sometimes the Game industry as a whole generates more market demand than it can supply. More often, one or two firms will underestimate the effectiveness of their sales efforts and sell out their stocks of goods before all their potential customers have been supplied (market potential exceeds Sales Volume). If a firm undersupplies its market, then competing firms may capture some of the sales it thus loses. Some of the customers not supplied by a firm in one quarter return the next quarter to the same firm. But, on the whole, at most 40 percent of the sales initially lost will be made up in following quarters - and only if enough goods are available then. Also, customers who turn to other suppliers may permanently shift their "brand loyalty", which adds the possible loss of

future sales to the immediate loss of sales, and hence profits, suffered by a firm that undersupplies the market.

It is also normal to plan for at least small carryover inventories of finished goods, so you'll have a little extra in case your firm's market potential exceeds your expectations. This can happen incidentally, if other firms undersupply their markets, even when you have accurately estimated your own. It is important not to overestimate your ability to supply the market. If you do so, you are likely to schedule more production than you can generate, and consequently you'll probably overspend on Plant Maintenance. More important, overestimating your ability to supply the market can lead you to make serious mistakes in Selling Price and Marketing Budget decisions. It can be very costly in terms of profit margin as well as budgeted expenditures to increase your market potential if you are unable to fill the market demand that you generate - you will have paid these costs without getting anything back for them!

However, your production volume decision has to be made within certain limitations: (a) your plant capacity (how much can I produce given the size of my factory? - which depends on your investment decisions) and (b) raw material availability. Production simply cannot be increased beyond 140 percent of your plant capacity, so your production decisions can be up to 40% in excess of plant capacity, permitting the availability of raw materials.

There are additional costs to be aware of when increasing production beyond plant capacity. These are increased maintenance and labor costs. For example, the cost of direct labor for overtime production is 50% higher than that of regular-time production. Also, the use of overtime generates added administrative costs (about \$50,000 per quarter, adjusted for inflation for increased payroll processing, ordering costs, etc.). This can be reduced with investment in Plant and Equipment Investment. Equipment such as computers are capable of greatly increasing administrative productivity.

When making your production decision it is a good idea to project at least a general picture of raw materials needed on hand as well as desirable build-ups and sell-offs of finished goods inventory during the year, as to meet customer demand (market potential). You may decide to manufacture more than you can sell during the low-demand quarters, if you are expecting the next quarter to have higher customer demand. In this way, you might avoid some costly overtime charges. However, this strategy will lead to inventory carrying costs (cost to store inventory) of approximately \$2 per unit of finished goods, adjusted for inflation. You need to carefully think about your desired production volume and what sort of market potential you want to develop each quarter and the appropriate production and inventory policy.

Raw Material Purchases Budget

Raw materials are the materials required to manufacture or produce the goods you intend to sell. You must carry inventories of raw materials in order to stay in business at all. The Production Volume actually attained by your plant will be limited by its supply of raw materials. For example, you may plan a production volume of 100,000 units, but have only enough raw materials to produce 75,000 units.

The raw materials available for processing in a given quarter are those on hand at the beginning of the quarter - that is, those left over from the preceding quarter plus those ordered by the previous quarter's materials purchase decision. So the current raw materials purchase order will not be available for processing until next quarter. The most crucial thing to remember about raw materials is that they must be ordered a full quarter before they are needed for processing.

Raw materials are purchased at the market price per unit, which goes up with the price index, but lags slightly behind. Every order placed also incurs substantial ordering costs (about \$50,000). These added costs do not vary with the size of the order. They do increase with inflation, but with a slight lag behind the general price index. These inventories cost money to maintain for storage, insurance, etc. and they tie up funds that might be better used elsewhere - the cost is approximately 5% of the inventory in stock at the beginning of the period. Therefore, it is quite important to balance these inventory storage carrying costs against other factors, such as the cost of placing raw material orders and the danger of shortages of raw materials and/or finished goods.

Plant Maintenance Budget

At the beginning of the game, a normal maintenance budget is approximately 75 cents per unit produced, however, the wages for the specialized personnel who do the maintenance work tend to rise with inflation. These increases in wages generally come before any increase in the general price index. When making your decision, keep in mind the cost of labour and your desired plant capacity. If you wish to support the same level of maintenance in the future, expenditures should be adjusted for inflation and capacity. If you don't increase your budget, your factory will deteriorate. This will make it difficult, if not impossible, to bring operations back to their former level of effectiveness.

Raw Materials cost per unit are affected to a small extent by maintenance expenditures, largely because poorly maintained production equipment tends to result in the need for repairs, rework, and even scrapping goods in process (wasting raw materials). Strong maintenance efforts will have the opposite effects.

Research and Development Budget

Research and development (R & D) is the function of product development also called product engineering. It is aimed mainly at improving and differentiating the firm's product to obtain a greater market share. It can also have a significant effect on manufacturing costs (labour and materials cost per unit of production) in future quarters as well. Keep in mind R & D expenditures do not have an immediate payoff; however over time their effects do accumulate in subsequent periods.

A firm may be penalized if its longer-run R & D needs have been slighted during the last quarters of play in order to stress expenditures with more immediate profit payoffs.

R & D and Robotics Investment are an important part of long-range plan, however, there are no really satisfactory guidelines for planning R & D and Robotics efforts. The initial R & D budget is \$100,000, which is reasonable. The most important thing to remember is the difficulty of recovering from inadequate R & D and Robotics policies; this stemming from the slowness with which these two areas of policy take effect.

Plant and Equipment Budget

As already mentioned, plant and equipment investment can improve the efficiency of your firm. It can increase your production capabilities and reduce costs.

To maintain a fixed production capacity, your plant and equipment investment each quarter must be about 2.0 percent (2%) of your current production capacity, multiplied by \$70 per unit multiplied by adjustment for inflation. The inflation effects tend to follow the general price index. You will also need to remember that Robotics Investment must be the same as in the previous quarter.

As in the real world, plant and equipment and Robotics investment always result in added expenses. These added expenses become significant when as much as \$1,000,000 or more is put into plant and equipment and Robotics in a single quarter. These extra costs incur in the Game just like the business world - costs like legal, architectural and engineering work, which stem from the disruption of normal business, and so forth. These appear as expenses rather than additions to the amount invested, which is advantageous for tax purposes. The accelerating costs of overly rapid expansion provide a strong reason for planning whatever expansion you want to undertake as a smooth progression of moderate steps.

Robotics Investment Budget

Robotics is the automation of a process. Investments in robotics can increase plant capacity, reduce manufacturing costs, and improve quality. Robotics can greatly increase productivity but there can be disappointments with this investment if they do not pay off. Also remember that the payoffs for changes in R & D and robotics are delayed, they will only begin to appear after a full quarter has passed, and build up over subsequent quarters. In addition, if you do not manage your cash flow well and make irresponsible investments you could have cash deficits and financing charges and penalties. So caution must be exercised with R & D budgets and investments in robotics.

In the Game, Robotics normally depreciates (loses value) at the rate of 5% per quarter or 20% per year. To maintain a given level of plant capacity, it is necessary to reinvest accordingly.

Decisions regarding robotics and R & D depend on the desires of your firm. If you wish to move slowly in the improvement of your firm, then these two decisions are not as big of a concern. If your firm wishes to try to improve more quickly than your competitors, more thought and much

more risk is involved. If you want, for example, to try to develop a novel product based on massive R & D and Robotics and justify a high Selling Price, you've got to keep in mind that this is a big gamble. You may win big, but you may also lose big - the risk is yours to take. In the short-term you may do a little testing and not the all-or-nothing approach, so that if it doesn't work out you can still recover.

Dividends Distribution

Ownership's rate of return on investment in real life and in the Game is an ideal basis for evaluating a firm's success. From the viewpoint of ownership, ROI is a long-run stream of payoffs, often in the form of a stream of dividends. Within the game it is important for you to understand the ROI criterion because it explains why you should bother to declare dividend payments. If the criterion used to measure management performance were simply total profits over the whole game then it would be logical to keep all earnings rather than distribute as dividends, as you would have plenty of money to expand or a comfortable cushion to protect your firm from possible cash flow problems.

In the Game, your owners want a large and consistent stream of income to pay bills or perhaps reinvest to earn more with their money. Profits, whether distributed or not, contribute to ROI by increasing the value of owners' equity. But money distributed to ownership sooner rather than just the end of the game has a larger effect on ROI than if the money was held within the firm until the end. Keep in mind the earlier the distribution, the greater the affect.

Management (you) has to decide what balance to strike between reinvesting profits in order to grow, and making dividend payments. You also need to ensure that there are enough cash reserves to safeguard against unpleasant surprises. As a safe rule it seems to be a good idea to issue dividends up to the point where you feel there is some small chance that cash flow problems could occur because of an unknown event(s). Be careful to keep that chance small and not big (cash flow is discussed later).

To see why it's worth taking at least some chance here, consider a numerical example illustrating the fact that dividends payments are good for ROI:

- Suppose Firm 1 and 2 start out with an owners' equity of \$10,000,000 and each of these firms earns a net profit of \$2,000,000 in two years of play.
- The firms differ only in their dividend payments: Firm 1 declares a \$150,000 dividend each quarter and Firm 2 keeps all of its earnings.
- It turns out Firm 1 will have an ROI of 10.03% and Firm 2 will have an ROI of only 9.54%.

This would be quite a significant difference in most runs of the game. This difference in dividends would not be changed if Firm 2 made one payment equal to all dividend payments of Firm 1, if they made the dividend payment at the end of the game. This illustrates the fact that early dividends matter more than later ones. The explanation for this difference is that if the

investor gets a given dividend sooner rather than later, than it can be used by the investor to earn returns in another investment. This earlier dividend is worth more to the investor than a later one. Keep in mind that unless ROI exceeds the average rate of inflation, ownership isn't earning anything in purchasing power or "real dollars". Real life investors may face this problem if earnings are low and inflation is severe.

No dividend will be permitted if Owners' Equity at the beginning of the quarter is less than \$9,000,000 or if the dividend declared will reduce the Owners' Equity to that point.

Return on Investment (ROI) and Game Strategy

You can calculate the exact ROI for any one quarter using the following formula:

$$ROI = (D(1) + E(1)) \div E(0) - 1$$

Where:

- OE(0) = Beginning owners' equity
- DIV(1) = Dividend payment in period 1
- OE(1) = Owners equity end of period 1

Expressing this formula in words, the quarterly ROI for any single quarter is calculated by:

- a. Adding the dividend issued in the first quarter (could be zero) to the value of owners' equity at the end of quarter 1;
- b. Dividing this sum by owners' equity at the end of the preceding quarter;
- c. Subtracting one from this quotient.

If you want to approximate ROI for a sequence of successive quarters, then using the procedure above:

- a. Calculate ROI for each quarter;
- b. Calculate the average of these values for ROI;
- c. Take 1 plus the average ROI to the power of the number of quarters;
- d. Subtract 1;
- e. Multiply by 100 for the percentage.

The Game has many uncertainties, making your job of maximizing ownership's return on investment (ROI) more challenging. The choices you make will strongly affect how the Game works out, but factors beyond your control will be comparatively important. Even if you made precise predictions of future economic activity, inflation and competitive behavior, you would still have only imperfect knowledge of how these factors fit together with one another and with your

own firm's decisions, to determine results. So every decision you make will be a risky one. There are no safe paths to follow. For instance, experience with the Game shows that the conservative approach of leaving old decisions unchanged is an almost sure road to disaster. You must adapt your firm to changes in its environment to be successful. Business is risky and as a management team you deal with the risks as best as you can.

For the purposes of the game, a mechanism must be used to account for what is left over at the end of the game to evaluate the continuing value of the firm. This is done by thinking of ownership as selling the firm for a sum of money equal to its replacement value at the end of the Game. Within the ROI model, this replacement value can be thought of as a fictitious final dividend used to close the outgoing managements books. This dividend serves as a plausible indicator of the probable value of the future dividend stream that would be forthcoming if the game continued.

In the Game, ROI is computed annually for each firm, and also at the end of play. The results are included in the End of Fiscal Year reports, which also rank the firms in order based on ROI to date. This ranking is used as the primary measure of comparative success among firms.

Reports

After completion of each quarter's decisions, you will receive a Quarterly Summary to provide you with feedback on your firm and your competitors.

Financial Report

The first three lines of each company's quarterly statement contain economic information relating to the quarter just completed and the next quarter. The first line states the industry name, and the period of business the report relates to. On the next two lines are listed various indices and rates. These are explained in more detail below.

MRI's Period 0 Financial Report
Price Index: 0.0, Forecast Annual Change: 0.0%
Economic Index: 100.0, Next Quarter: 100.0
Seasonal Index: 100.0, Next Quarter: 95.0

Price Index

The price index is an indicator of price changes of all kinds. However, some price changes tend to lead or lag the indicator (for example, raw materials lags slightly behind the price index; plant maintenance leads increases in the price index), so this will not exactly predict current or future

price changes. The forecast annual change is the same index (price) in the near future. The price index is related closely to inflation.

Inflation

Inflation reflects an increase in the general level of prices, while deflation reflects a decrease in the general level of prices. The causes of inflation are complex and are generally related to an increase in the supply of money, relative to the supply of goods and services available for purchase. The game contains a significant inflationary trend to give you an opportunity to face challenges like those stemming from inflation in the business world. An advantage can be had over competitors that have chosen to ignore inflation and its effects. Good managers will anticipate increased prices due to inflation in their strategic planning and cash management.

Economic Index

Economic factors are measured by the economic index and seasonal index. One note to make is that each one percent increase in the economic index results in about a 1.4 percent increase in market potential. The same relationship holds (in the opposite direction) when there is a one percent decrease. Note again that both the current indices as well as forecasts for the next quarter are included at the top of the financial report.

Seasonal Index

Seasonal index standard values are printed at the bottom of the decisions sheet. You will note that the year-round average is 100, and that there are many fluctuations. It is important to use the seasonal index to plan quarterly production. For instance, when the seasonal index falls from 100 to 95 then (if other things remain unchanged) sales will drop by about five percent.

Interest Rate

The interest rate next quarter is the rate that will be used to calculate financing charges, if incurred, in the next quarter.

Operating Statement

The Operating Statement summarizes the sales and production aspects of the business.

* * O P E R A T I N G S T A T E M E N T * *	
Market Potential	109,720
Sales Volume	109,720
Percent share of industry sales	11
Production volume (this quarter)	100,000
Closing inventory of finished goods (units)	12,750
Plant Capacity, Quarter 1	104,643

Market Potential

Market potential is the demand generated for your product in the previous period. All firms at period 0 have generated the same market potential. Read this section of the game guide for more information on market potential.

Sales Volume

Sales volume is the amount that your firm produced in the period. In period 0 this is exactly the same as market potential. This condition may or may not exist after future decisions. It is possible for a firm to underestimate the effectiveness of their sales efforts and sell all their stock of goods before all potential customers have been supplied. In this case market potential would exceed sales volume.

Percent Share of Industry Sales

Percent share of industry sales represents the company's percentage share of industry sales during the quarter. If there are five firms in an industry, you could hope to generate at least 20% ($100\% / 5$) of total industry sales.

Production Volume

Production this quarter states the number of units that you produced in the period. This will always agree with your production volume decision for the previous quarter provided:

- You have not asked for more units of production than your factory can produce. However, you can produce up to 140% of plant capacity by using overtime.
- You have enough raw materials on hand to produce as many units as asked for. Remember, raw materials must be ordered a full quarter before they are needed.

Closing Inventory

Closing inventory of finished goods provides the quantity of finished goods available for sale, but not sold during the period just completed. This inventory of finished goods will be available for sale during the next quarter in addition to the units produced next quarter.

Finished Goods Inventory

Finished goods inventory, this quarter = Production Volume + Finished Goods Inventory, Previous Quarter - Sales Volume

Plant Capacity

Plant capacity, next quarter is a measure of plant size. It is equal to the output attainable with a single shift and no overtime, provided sufficient raw materials are available. You can produce up to 140% of plant capacity, if you have enough raw materials, by using overtime.

Income Statement

The Income Statement summarizes the revenues and expenses of the firm for the quarter. It is important to remember that expenses do not always directly represent outflows of cash during the quarter. Examples of this include: materials consumed, reduction of finished goods inventory, depreciation of plant, equipment and robotics. Also, cash outlays are not always expenses. For example, plant and equipment investment is not an expense - you can see that it is not listed on the income statement.

* * I N C O M E S T A T E M E N T * *		
Total Revenue (sales revenue)		\$ 2,808,832
Expenses		
Marketing	\$ 200,000	
Research and Development	100,000	
Administration	278,000	
Maintenance	75,000	
Labor (regular time cost/unit 5.73)	573,939	
Raw materials consumed (cost/unit 6.31)	630,667	
Reduction, finished goods inventory	116,638	
Plant+eq depreciation (rate/qtr 2.50%)	183,125	
Robotics depreciation (rate/qtr 5.00%)	0	
Finished goods carrying cost	25,500	
Raw materials carrying cost	41,533	
Ordering costs	50,000	
Plant investment expenses	25,000	
Financing charges and penalties	0	
Sundry expenses	82,000	
Total Expenses		\$ 2,381,402
Profit before income tax		\$ 427,430
Income tax or refund (Inv. credit 0.00% surtax 0.00%)		\$ 145,326
Net profit after income tax		\$ 282,104
Dividends		\$ 53,000
Addition to owners' equity		\$ 229,104

Total Revenue

Total revenue (sales revenue) indicates the revenue that you received for the units that you sold in the quarter, that is, sales volume x selling price. In this case: 109,720 units x \$25.60 = \$2,808,827.

Expenses

Marketing, R & D, Maintenance, are expenses as budgeted by your decision for the period. These budgets must be increased in proportion to inflation to maintain effectiveness as the game progresses. The maintenance budget should ideally increase ahead of the inflationary trend and change in proportion to Production Volume.

Administration

Administration consists of mainly overhead costs largely connected to plant size, production and sales volume. These costs increase in proportion to inflation, but the changes lag one quarter behind the general price index. Introduction of an overtime shift increases this expense by approximately \$50,000 per quarter.

Labor

Labor costs for regular time vary with inflation, lagging slightly behind the price index. The report indicates the regular labor cost per unit of output as well as the total labor cost. The overtime rate is 50% higher than the regular rate.

Raw materials Consumed

Raw materials consumed are the cost of raw materials processed in the quarter. The cost of raw materials at the beginning of the game is \$6.31 per unit, but the market price will increase with inflation. Research and development, robotics, and maintenance can also influence the cost (typically decreasing the cost per unit). The net change in unit cost from the previous quarter can, therefore, be either positive or negative. The current cost per unit for raw materials is provided in the report.

It is very important to note that the figure for raw materials consumed is not a cash outlay. This expense figure measures the change in value of the physical inventory of raw materials (amount consumed multiplied by current unit cost); it does not measure the amount actually paid for purchases of additional raw materials.

Reduction, Finished Goods Inventory

Reduction, finished goods inventory relates to finished goods rather than raw materials. Once again this cost can be either positive or negative. It is valued according to the current standard cost per unit of materials and labor - \$12 per unit, increased in proportion to the price index. The standard cost need not agree with the actual sum of labor and materials costs per unit as they vary due to research and development, robotics, and maintenance. The variance from the standard cost per unit reflects how successful you have been in keeping costs down.

Plant and Equipment Depreciation

Plant and equipment depreciation is a non-cash expense, which means that while depreciation reduces income, it does not cost the company any cash. Depreciation is normally charged at 2.5% of the book value of equipment at the start of the quarter. This 2.5% slightly exceeds the deterioration of production capacity.

Depreciation of Plant and Equipment = Plant and Equipment, Book Value \times 2.5%

Robotics Depreciation

Robotics depreciation is also a non-cash expense. Depreciation of robotics is normally charged at 5% of the current book value of robotics equipment.

$$\text{Depreciation of Robotics} = \text{Robotics Equipment, Book Value} \times 5\%$$

Finished Goods Carrying Cost

Finished goods carrying cost is about \$2 per unit at the beginning of the game and increases in proportion to the price index but with a one-quarter lag. This is a cash expense to cover items such as storage costs and insurance.

Raw Materials Carrying Cost

Raw materials carrying cost is about 5% of the raw materials inventory on hand.

Ordering Costs

Ordering costs for raw materials are about \$50,000 every time an order is placed, but increases in proportion to the price index with a one period (quarter) lag.

Shift Change Costs

Shift change costs are not relevant to the regular game; they apply only to model 2 that will not be used.

Plant Investment Expenses

Plant investment expenses are cash outlays that result from investment in plant and equipment and robotics. They are expensed because it is advantageous from a tax point of view. They can be predicted by using the following formula:

$$\text{Plant investment expenses} = (\text{plant and equipment and robotics investment})^2 \div 10,000,000$$

You will see by using this formula that large "crash" expansions generate a much greater expense than a series of moderate expansions. Inflation does not need to be considered here other than the fact that it tends to increase the size of plant and equipment and robotics investment needed to accomplish any given result.

Financing Charges

Financing charges and penalties occur when cash assets fall below zero (you must pay interest on borrowed money). They are calculated by multiplying the current interest rate by the amount

the company's cash is below zero by the quarterly interest rate. The quarterly interest rate is the interest rate, as shown in Figure 1, divided by four. The expenditure related to financing charges and penalties appears one quarter after the shortage occurs.

In the Game, financing charges and penalties are not very important for cash shortages of \$100,000 or \$200,000; but they grow to hundreds of thousands of dollars per quarter if a shortage reaches around a million dollars. Past this point, financing costs can easily wipe out even the healthiest operating profits, possibly leading to bankruptcy.

Sundry Expenses

Sundry expenses are fixed operating charges that go up and down with production capacity and inflation. They are also somewhat influenced by research and development and plant and equipment expenditures.

Income Tax

Income tax or refund in the game will be levied at 34% of quarterly gross profit (or profit before tax). If profits are negative you will receive a cash refund equal to the amount of tax that would have been paid had you realized a profit. Tax on current income is paid in the quarter incurred, and any refund is returned in that quarter and becomes cash on hand.

Net Profit

Net profit after income tax equals profit before income tax less income tax. This number represents the amount of profits available to the shareholders or losses accruing to shareholders. In real life, continued losses may lead your shareholders to fire its current management and replace you with other managers.

Dividends

Dividends paid depend on your submitted decision.

Addition to Owners' Equity

Addition to owners' equity is the remainder of net profits after income tax less dividends paid. This figure will be negative if the company suffers a loss or pays a dividend greater than its after tax profits.

Cash Flow Statement

The Cash Flow Statement should receive your close attention.

* * C A S H F L O W * *		
Total receipts (sales revenue)		\$ 2,808,832
Disbursements		
Cash Expenses	\$ 1,450,972	
Net income tax payment	145,320	
Dividends paid	53,000	
Robotics investment	0	
Plant investment	500,000	
Materials purchased	1,000,000	
Total disbursements		\$ 3,149,296
Net addition to cash		\$ -340,466

Total Receipts

Total receipts are identical to total revenue on the income statement. This number represents the amount of cash received during the quarter. All sales are cash sales.

Disbursements

Under disbursements, cash expense does not include all of the expenses listed in the Income Statement. Remember, the non-cash expenses are excluded from this report, such as raw materials consumed, depreciation, and reduction of finished goods inventory. Net income tax payment and dividends paid are exactly the same as the corresponding items listed in the Income Statement.

Robotics and Plant Investment

Robotics Investment and Plant and Equipment are the cash outlays in the amount indicated by your quarterly decisions. Investment in robotics and plant and equipment are not available for use until the next quarter representing the time it takes to construct these investments.

Materials Purchased

Raw Materials Purchased is considered to be an outlay of cash in the amount indicated by your quarterly decisions. This expenditure is for materials that are ordered for production use in the next quarter. Remember, raw materials must be purchased a quarter before they are needed.

Net Addition to Cash

Net addition to cash is the difference between receipts (revenue) and disbursements. This can be negative, in which case it is a reduction of cash on hand. It is important to note that a firm

can be profitable and at the same time experience a reduction of cash on hand. Profits are not the same as the increase or decrease in cash during the quarter.

Financial Statement

The Financial Statement (or Balance Sheet) lists the assets of the firm and their total.

* * F I N A N C I A L S T A T E M E N T * *	
Cash Assets	\$ 1,022,000
Inventory value, finished goods	153,000
Inventory value, raw materials	1,200,000
Robotics book value	0
Plant + equipment book value	7,325,000
Owners' equity	\$ 9,700,000
Robotics replacement value	0
Plant + equipment replacement value	7,325,000
Owners' economic equity	\$ 9,700,000

Cash Assets

Cash assets are the actual amount of cash on hand. The amount is equal to the preceding quarter's cash value and this quarter's net addition to cash. Cash can be negative in which case the company will incur financing charges as described earlier. If cash assets drop to -\$6,000,000, the team will be considered bankrupt!

Finished Goods Inventory Value

Inventory value, finished goods is the value of finished goods on hand. This can be determined by:

Inventory value, finished goods = Finished goods inventory, last quarter - reduction, finished goods

Raw Materials Inventory Value

Inventory value, raw materials is the value of raw materials on hand. This can be determined by:

Inventory value, raw materials = Inventory value, raw materials (last period) + materials purchased (this period) - value of materials consumed in production this period

Robotics and Plant Book Value

Robotics book value and plant and equipment book value represents their total cost less accumulated depreciation from prior periods. Due to inflation these values are not precise indicators of plant capacity, which is listed elsewhere as a separate item on the quarterly report.

Book value = Book value, previous period - depreciation + additional investment

Owner's Equity

Owner's equity is the sum of the values of the firm's assets, calculating plant and equipment and robotics at book value. This is equal to its value in the previous period plus addition to owners' equity from the current period.

Plant and Equipment Replacement Value

Plant and equipment replacement value is the amount that you would have to pay to replace existing capacity at \$70 per unit of production, adjusted for inflation. Robotics replacement value is what you would have to pay to replace robotics at current prices.

Owner's Economic Equity

Owner's economic equity measures the economic (or replacement) value of the company's assets. This number is a more accurate measure of the company's value because it includes the replacement value of robotics and plant and equipment instead of the book value. The book value of an asset is based on the original cost of the asset less accumulated depreciation. Book value, therefore, does not represent the replacement cost or value of an asset.

Competitor Report

The Competitor Report provides you with information about your competitors for the period just completed. This report lists the past quarter's Selling Price, Dividends, Sales Volume and Net Profit for each firm in the industry. This information will help you to keep up to date, to some extent, on what your competitors are doing. Additional information is provided on the progress of competitors in an end of fiscal year report.

Information on Competitors Report
Period 4

Firm Name	Price	Dividends	Sales Volume	Net Profit
Team 149	\$33.13	0	179,857	694,583
Team 167	\$29.98	0	149,603	-12,091
Team 183	\$26.00	0	26,796	-262,300
Team 177	\$28.12	0	80,601	-417,694

Year End Summary

In addition to the quarterly Summary at the end of each year (after 4 quarters) and at the end of the Game a report is prepared that provides you with your Return on Investment and your rank, your current position in terms of the highest ROI. In addition you are given the position of your competitors along with their ROI. This information along with the quarterly reports provides you with insight to what sort of policies have been more or less effective in your particular Game. You may have your ideas of what other firms did that worked or did not work, but you will not know for certain, especially since it would be a number of interacting factors. However you will gain a greater understanding of how the Game works, which should help make even better decisions for your own firm going forward.

Executive Game One Year Summary, Year Ending with Period 4 End of year figures

	Net Cash Assets	Inventory Value Fin. Goods	Inventory Value Raw. Mats.	Robotics Replacement Value	Plant Replacement Value	Owners Economic Equity
1	-366,237	0	820,404	2,833,112	8,019,860	11,307,139
2	854,181	207,517	581,110	6,300	7,570,159	9,219,267
3	-2,561,699	111,338	1,078,215	1,030,572	9,263,065	8,921,491
4	-3,911,695	1,288,360	829,430	2,209,775	8,407,511	8,823,380

1. Team 149
2. Team 183
3. Team 177
4. Team 167

Averages per Quarter for Fiscal Year 1

	Marketing Budget	R&D Budget	Sales (Units)	Net Profit	ROI Percentage *	ROI Rank
1	782,500	1,070,000	169,459	249,529	17.90	1
2	47,500	29,250	47,010	-234,479	-4.77	2
3	403,147	287,500	79,621	-295,755	-6.50	3
4	798,219	660,149	139,465	-380,167	-8.83	4

* ROI (Rate of return on investment) is based on dividends for all periods to date and End-of-year owners' economic equity. ROI Ranks are the firms' ranks in the industry, from highest to lowest, based on ROI.

1. Team 149
2. Team 183
3. Team 177
4. Team 167

Bankruptcy and Cash Planning

Bankruptcy occurs when a firm is unable to make necessary expenditures (or interest/financing payments) due to a severe cash shortage. Teams must closely monitor their cash position to avoid bankruptcy, as this will remove them from the Game!

Very Important!

Bankruptcy will set in once any team reaches the point where they owe \$6,000,000 (Cash Assets of -\$6,000,000). The firm is then removed from the game and is no longer eligible to qualify for prizes or advancement and is considered to be in receivership.

Once a team's cash assets have reached negative four million or lower (-\$4,000,000), they will receive a warning indicating that care should be taken with their next decision, as they are very near bankruptcy. A team will receive at least one warning prior to going bankrupt. Therefore, if their cash assets were to suddenly drop to -\$6,000,000 but they have not yet received a warning, they will first receive a warning prior to being declared bankrupt.

Determining your cash flow is very important. All of your planning should be supplemented by or include cash projections, which are simply predictions of your firm's cash position over the term of the plan. The following equation will be helpful:

Cash assets, end of quarter = cash assets, beginning of quarter + revenue during quarter - cash disbursements during quarter

The cash assets, beginning of quarter will come from your most recent Financial Statement (it will be your ending cash assets at the end of the last quarter). The revenue and cash disbursements should be predicted by your planned decisions, using your most recent Cash Flow Statement as a guide. Remember that if you anticipate a cash shortage, you will need to also budget for additional financing charges and penalties.

Cash planning is very important in the Game, as in real life, because the large costs of financing can become crucial and also because a lack of funds takes away a firm's chance to take advantage of unexpected opportunities. Note that bankruptcy is not a matter of realizing losses on the income statement, but one of being unable to pay your bills. It is quite possible for an over-expanded firm in the Game to collapse financially even though its operating profits (before financing costs are considered) are positive. Deficits larger than a few thousand dollars point to the urgent need for re-planning. Even small shortages require caution because of the financing costs, which can cause the problem to become even bigger.

In general the re-planning called for when unacceptable cash deficits are projected will emphasize reduced Dividends, and often less money put into Research and Development, Plant and Equipment and Robotics Investment. This also usually implies reducing projected values of Production Volume and when appropriate cuts can be made in planned Maintenance Budget. Also, usually to follow are small cuts in Marketing Budget and small increases in Selling Price. The planned reductions in Production Volume and your other decisions could intensify your cash difficulties, therefore caution must be exercised.

The opposite of a cash shortage is cash excess. If you have any substantial amount of cash on hand, beyond what is needed as reasonable protection against setbacks, it should be invested in operations or distributed as Dividends.