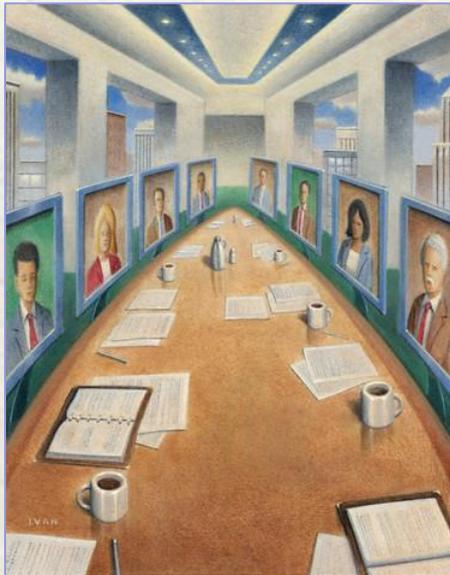


Decision Support Systems and Decision Analytics

D-code Applications



- Starship Technologies
- Dr. Warped
- Jungle Jim
- MCL Corporation
- YumYum Corporation
- Novartis





STARSHIP TECHNOLOGIES

Starship technologies is the brainchild of a few key ex-NASA employees. Starship provides satellite launch capabilities for low weight payloads to the communications and pharmaceutical industries. The principals wish to know whether their venture can be profitable. They wish to retire in four years, and prepare some preliminary data for analysis:

- Initial target for launches is set at four per year, increasing by two each year.
- The initial selling price is set at \$10,000 per payload pound, but will be reduced by 2% each year as volume increases.
- The payload size for the Stargate IV rocket is 500 lbs.
- Variable costs include:
 - Engineering and Administration at \$2000 per payload pound
 - Fuel at \$5000 per payload pound
- Annual Fixed costs include:
 - Office and Launch Pad Rental Expenses: \$700,000
 - Salaries: \$500,000
 - Utilities: \$100,000

Assuming a 46% tax rate for Starship, what is the profitability outlook for the next four years. What happens to net profit if fuel cost is increased 20%?

STARSHIP TECHNOLOGIES

STARSHIP TECHNOLOGIES

D-code Model



STARSHIP TECHNOLOGIES

D-code Initial Solution

STARSHIP TECHNOLOGIES

What-if Solution

What happens to net profit if fuel cost is increased 20%?



DR. WARPED

Dr. Warped, a deranged yet creative and entrepreneurial scientist, was in his lab one day when he came up with a concoction that he believed would grow hair on people experiencing hair loss. He decided to immediately do a trial consisting of 50 people to confirm his beliefs. Unfortunately for Dr. Warped not one person grew even a single strand of hair, the only noticeable effect was that all 50 people experienced some strange hallucinations which were not totally unpleasant for them. At first he was extremely disappointed, but his disappointment quickly turned into confusion when several people in the study approached him and inquired about getting a yearly supply of the drug. He then came to the realization that the drug might have some profit making potential even if it couldn't grow hair. So Dr. Warped decided to try his luck. But before taking a chance in this new venture, he decided to do some modeling to see how profitable his new line of work would be.

DR. WARPED

Dr. Warped knows that the venture will just last 6 months, from July to December, in order to minimize the chance of being caught and sent to jail. He believes the customer base will grow to 50 during the first month and increases 50% every month as more people become familiar with the drug. On average, each customer will make 2 purchases the first month with a 25% increase every month after that. The drugs will be sold in packages of 10, at an initial price of \$5 a pill. Dr. Warped plans to increase the price of each pill by 25 cents a month. The Overhead for the operation will consist of Manufacturing expenses and Administrative expenses:

Manufacturing Expenses:

The Ingredients for each pill cost \$1.25
Equipment depreciation = \$1000 Per Month
Lab Technician = \$12,000 Per Month

Monthly Administrative Expenses:

Rent = 1800
Utilities = 525
Travel Expense includes:
Gas = 200
Insurance = 100
Maintenance = 200

DR. WARPED

DR. WARPED
D-code Model

DR. WARPED
D-code Solution



JUNGLE JIM

Jungle Jim runs a company offering Jeep tours into the African Grasslands in Kenya. He has recently increased his fleet to 10 jeeps, 10 drivers and 10 guides. Each Jeep can carry 8 tourists plus the driver and the guide. The ticket prices for a full-day tour are 175 dollars a person and a half-day tour is 100 dollars per person. Five jeeps run two half-day tours and the remaining five run full-day tours. Jim's insurance company charges him 20 dollars per tourist regardless of the tour length. Each jeep consumes 50 dollars in fuel per day. Jim believes fuel expenses will increase 2.5% each month for the next six months. He anticipates a 2 dollar increase per ticket for full-day tours and a 1 dollar increase per ticket for half-day tours to cover the increase in fuel expenses. Jim also pays a semi-annual licensing fee of 3000 dollars to the Kenyan government. The 10 jeeps are leased through Kenyan Motors for 100 dollars per month per jeep. Each half-day guide is paid 50 dollars a tour while each full-day guide is paid 80 dollars a tour. Drivers are paid 60 dollars for a full-day tour and 30 dollars for a half-day tour. Jim believes each jeep to be 70%, 85%, 90%, 90%, 80%, and 75% full over the next six months. Help Jim estimate his profit for the next six months assuming he runs his tours 20 days each month.



JUNGLE JIM
D-code Model

JUNGLE JIM

D-code Solution



MCL CORPORATION

The MCL Corporation is planning to diversify and wishes to evaluate the profitability of the new venture over the next eight quarters. Marketing research has provided the following quarterly information:

- The total market for the product will be 7,000 units at the start of production and will grow at the rate of 1% per quarter;
- MCL's initial share of the market is 11%, and this is expected to grow at the rate of .5 % per quarter if intense marketing efforts is maintained;
- The selling price is expected to be \$2.50 per unit the first year and \$2.65 the following year;
- The standard cost system has produced the following estimates:
 - selling expenses = \$0.233 per unit
 - labor cost = \$0.61 per unit
 - raw materials = \$0.42 per unit
- General and administrative expenses are estimated to be \$450 in the first quarter with a quarterly growth rate of 1%; and,

MCL CORPORATION



MCL CORPORATION
D-code Model

MCL CORPORATION

D-code Solution





YUMYUM CORPORATION

The YumYum Corporation makes nutritious candy bars. Next month the company plans to sell nearly 200,000 pounds of candy. This candy will be packaged as 600,000 bars; the price YumYum will receive is 18 cents for each bar. Production capacity for the plant is 640,000 bars per month. The cost estimates for next month are:

Fixed Costs:

- Fixed Manufacturing Costs (Factory Overhead) \$ 7,500
- Fixed Administrative Costs (Office Overhead) \$ 11,500
- Advertising \$ 4,500
- Interest \$ 4,100

Variable Costs:

- Labor 4 Cents Per Bar
- Materials 8 Cents Per Bar

YUMYUM CORPORATION

The General Manager feels that the profit of YumYum is not satisfactory. Various alternatives are being considered to bring the profitability of the company up to 11% return on sales. Return on sales, which General Manager abbreviates as ROS, is the before-tax profit divided by sales revenue, expressed as a percentage (ignore the reality of tax and refer the term “profit” to “profit before tax”).

Construct an influence diagram for the YumYum Corporation and determine profit and ROS for next month based on the projections just given. If full capacity (640,000 bars) is reached next month, what will profit and ROS be?

YUMYUMCORPORATION

YUMYUMCORPORATION

D-code Model

YUMYUMCORPORATION

D-code Initial Solution

YUMYUMCORPORATION

D-code What-if Solution

YUMMYUMCORPORATION

The General Manager is planning for the next five months of operations. For the first month, the price will be \$0.18 per bar; after that, the price will increase to \$0.19 for two months, and then to \$0.20 for two months. The number of bars made and sold is projected to begin at 600,000 bars, and then increase 2.5% each month, without regard for capacity limitations. Because of the rapid growth, substantial increases in other costs are projected as follows:

- | | |
|--|---|
| – Fixed Manufacturing Costs (Factory Overhead) | Increase 5% Per Month |
| – Fixed Administrative Costs (Office Overhead) | Increase 7% Per Month |
| – Advertising | Increase 8% Per Month |
| – Interest | Will Not Change |
| – Materials | Will Not Change |
| – Labor | Increase 0.1 Cents
(\$0.001) Per Bar Per Month |

Determine the profit before tax for each month, the ROS for each month, and the Year to date profit (beginning in the first month) using these projections

YUMYUMCORPORATION

D-code Model

YUMYUMCORPORATION

D-code Solution



Novartis is a world leader in the research and development of products to protect and improve health and well-being. Novartis is considering the acquisition of an pesticide for the control of Lepidopteran insect pests that is in the later stages of development at Merck. Merck is interested in leaving the insecticide business to concentrate on its other efforts in pharmaceuticals. Merck expects that the insecticide, with a trade name of Predator, will have EPA registration early in 2003 (i.e. there will be no sales in 2002). Novartis believes that this product will complement its product line and will gain a significant share of the Lepidopteran insect market over the next 8 years.

The total insecticide market will be 455,000,000 kg in 2002 and it is expected to grow 2% per year. The Lepidopteran market is 35% of the total insecticide market. The first year (2003) sale price is \$12.75 per lb. After that the price is expected to be \$12.25 per lb for 4 years and then \$11.75 for 3 years. Assuming registration is obtained early in 2003, Predator[®] should gain a 5% share of the Lep market that year, 9% in 2004, 15% in 2005, 25% for the following two years, and then drop off by 90% each year after that.

NOVARTIS

The process cost will start at \$5.75 per lb in 2002 and 2003, drop to 5.25 per lb for 4 years, and then drop again to \$4.75 per lb. The distribution cost is \$1.55 per lb in 2002 and will increase \$.11 per lb each year thereafter. The material cost will be \$2.15 per lb in 2002 and increase 2.5% per year.

The costs of upgrading and maintaining the plant are \$25,000,000 in 2002, \$15,000,000 in 2003, \$5,000,000 in 2004, \$2,000,000 for each year thereafter. The R&D cost to complete EPA registration work in 2002 will be \$55,000,000. Other R&D costs for label expansion are expected to be \$35,000,000 in 2003, \$15,000,000 in 2004, and \$5,000,000 in 2005. Administrative expenses are expected to be 2.4% of sales. Depreciation expense on new plant equipment \$10,000,000 per year for six years. Interest expense as a result of the acquisition is expected to be \$500,000 per year. Salaries will be \$35,000,000 and expected to rise an average of 5% per year. Benefits are 19% of salaries. Advertising expense will start in 2003 at \$3,000,000, increase to \$6,000,000 for 3 years, and be decreased to \$2,000,000 for the remainder of the years. Assuming the tax rate of 25%, what is the total profit after tax over the next 8 years.

NOVARTIS

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NOVARTIS
D-code Model

NOVARTIS
D-code Solution