



Title: Development of a Strategic Business Plan for a Company in the Defense Industry

Course:

Year: 1990

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Report No: P90017

ETM OFFICE USE ONLY

Report No.: See Above

Type: Student Project

Note: This project is in the filing cabinet in the ETM department office.

Abstract: The purpose of this project is to integrate or synthesize engineering management concepts into real situation related issues. We investigate many types of techniques in deciding what course of action should be taken. Starting with the analysis of the strength, weakness, opportunity and threats (SWOT); we came up with several marketing plans. Scenario analysis was used to predict the future and it affects on our strategy. The Hierarchical Decision Modeling (HDM) technique is employed in order to prioritize our plan under multiple criteria. The capital budgeting and sensitivity analysis gave the most feasible plans to follow in the future. The result of this project is a recommendation and description of methods for marketing strategic decisions in the dynamic high tech market place.

Development of a Strategic Business Plan
for a Company in the Defense Industry

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EMP-P9017

1. This is of course, hypothetical and "can be anything you wish..." This still bothers me; nonetheless, you seem to have grasped the STRATEGIC WAY OF THINKING. This is the most important thing. You state that you have learned and have integrated the various principles. This is the most important objective. Strangely, I believe you.

PORTLAND STATE UNIVERSITY

2. Many unfortunate errors in presentation. You need a good detail person. Almost inexcusable

DEVELOPMENT OF A STRATEGIC BUSINESS PLAN

FOR A COMPANY IN THE DEFENSE INDUSTRY

A PROJECT REPORT PREPARED

FOR

EMGT 560

ENGINEERING MANAGEMENT SYNTHESIS

by

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PORTLAND, OREGON

AUGUST 1990

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Not there

EXECUTIVE SUMMARY

**EMGT560
ENGINEERING MANAGEMENT SYNTHESIS**

**DEVELOPMENT OF A STRATEGIC BUSINESS PLAN
FOR A COMPANY IN THE DEFENSE INDUSTRY**

TEAM MEMBERS

John Domogalla
Hogan Lim
Raman Nayyar
Henry Oberhelman
Edmundus S. Pancoko

Hypo Inc. (a hypothetical company) is around \$4 billion dollar company that derives most of its business(60%) from the defense industry. The continued improvements in the relations between the superpowers and the positive developments in Eastern Europe have significantly diminished the threat from the Communist Block. This has led to defense budget cuts and the future seems to indicate only further cuts.

✓
arabs?

It would have to undergo a process of massive reorientation so as to minimize the impact of the budget cuts.

In this project, we have formulated a STRATEGIC BUSINESS PLAN (not just a marketing plan) that could be used by Hypo. It is a logical and systematic process that a company's management should follow when trying to develop a long range plan.

✓

We studied five possible commercial market segments where Hypo's existing expertise could be put to immediate use. This would enable it to absorb the idle capacity in the organization created by the defense budget cuts. The five markets are:

✓

Robotics

Fiber-Optics

Nuclear Industry ✓

Satellite Communication

Expendable Launch Vehicles

The final result is recommendations as to the possible route Hypo's management could pursue. The strength of the paper lies in the fact that we have integrated/synthesized concepts learned during the Engineering Management program. The final decision making took inputs from various sources:

✓

- Scenario Analysis
- Multi-criteria decision making(used HDM) ✓
- Sensitivity Analysis
- Financial Performance Analysis (NPV, IRR & Payback)
- Optimal Capital Budgeting

This project has helped us develop a strategic mind set and realize the importance of Strategy and Long range planning using good decision making principles. It might seem difficult to believe, but the integration of the various principles proved to be a very interesting and challenging exercise.

good

ENGINEERING MANAGEMENT SYNTHESIS

DEVELOPMENT OF A STRATEGIC BUSINESS PLAN
FOR A COMPANY IN THE DEFENSE INDUSTRY

INTRODUCTION :

The Defense Department has changed direction to align with the global political situation. We are facing a very challenging situation. Our major customer, The Department of Defense proposed budget cut of 11% by 1995. It has a big impact on our company, and as a result our sales will fall as much as 46%, to \$1.3 billion per year in 1995. Thus we need a new strategy to survive.

After better establishing our current status via library research and group consensus, we will seek a set of practical strategies. We are recommending the best course of action to maintain a viable organization. The problem is relevant, realistic, and representative of a general class of problems that exists in dynamic high tech market places.

Strategic management has a big role in the direction of the company for the future. We have to be able to analyze the external and internal environment that is shaping an organization in order to reach the mission. The strategy is the way we get there.

The purpose of this project is to integrate or synthesize engineering management concepts as applied to real situation related issues.

This project investigates many types of techniques in deciding what course of action we should take. Starting with the analysis of the strength, weakness, opportunity and threats (SWOT); we came up with several marketing plans. Scenario analysis was used to predict the future and how it affects our strategy. The HDM technique is employed in order to prioritize our plan under multiple criteria. The capital budgeting and sensitivity analysis, then gave the most feasible plans to follow in the future.

The result of this project is a recommendation and description of methods for making strategic decisions in dynamic high tech market place.

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BUSINESS PLAN

SITUATION ANALYSIS

Introduction

Situation or environment analysis is a must for a strategist in order to know the opportunities and threats to our company that exist in the external environment. Are they still the same as we have assessed in the past? If not, we have to adjust our strategy. By anticipating the opportunities and the threats in our environment, via this early warning system we gain valuable response time to develop or redefine our strategies. If we don't take any action to these changes, our company could be adversely affected or lose a golden opportunity.

Impact of macro environment:

There are several factors which affect our firm in each sector of the environment. For the defense industry the relevant sectors are economic, political and legal trends, and technology.

Economic Trends

The global competition and dramatic political changes are leading the environment toward economic power and not military power. The economic trend for all businesses - large and small - is to become competitive in the global market place. Some must do it because foreign competitors are entering their U.S. markets. Some do it to stabilize operations.

Two strategies are used. The international strategy tends to customize products for each nation's needs. While a global strategy tries to enlarge the market for a single universal product.

Political and Legal Trends

This sector has the biggest impact on a typical defense contractor like us. Many weapons manufacturers are facing a highly uncertain future due to the recent political activities throughout the world. This is especially critical to those whose business was linked to the cold war between USSR and USA. For example the recent moves towards reunification of Germany highlights the move towards world peace and subsequent defense cuts.

The Soviet and Eastern Europe.

The recent political developments in Russia and Eastern Europe have a tendency towards economic development rather than build up of military might. We expect that the recent trend towards democratic forms will continue this trend.

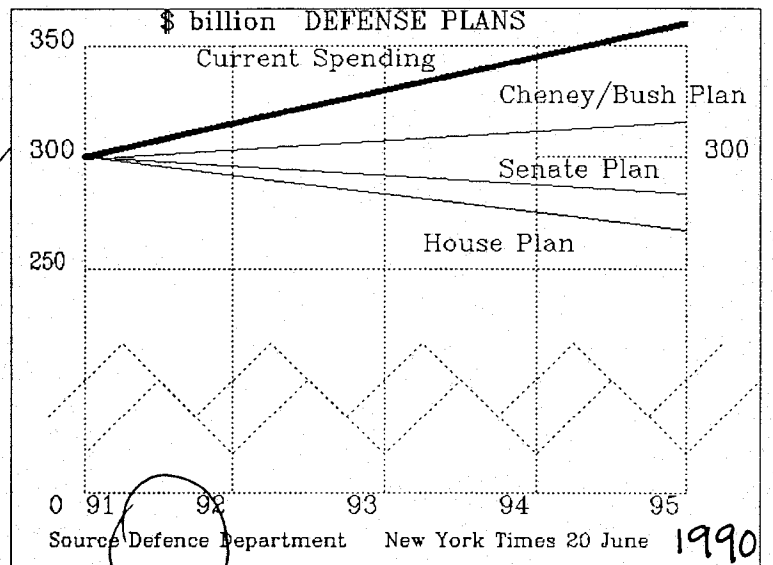
The U.S. Defense Budget.

A major portion of our current business services comes primarily from the U.S. Department of Defense (DOD). The Secretary of Defense, Dick Cheney, has already proposed a Pentagon budget cut of 11% by 1995. This would lead to cut throat competition in the near future for limited new projects and cutback in existing projects (See following figure).

Legislators will surely want more of a peace dividend when they see what Mr Cheney selective cuts didn't affect: billions to develop Star Wars... billions more for needless weapons like the B2 Stealth bombers, A-12 fighter planes and C-17 cargo transports.

The Congressional Budget Office would apply a 25% cut across the board instead of the selective method used by Cheney. This plan was predicted to double the operating budget savings predicted by Cheney. The Congressional agency would cut the Star Wars research and development of new weapons by 25%, while Cheneys plan left them untouched. {NYT3}

Moreover, they find it hard to understand why a 25% cut in overall forces only results in a 10% reduction in costs. Many politicians are prepared to cut much further. {NYT2}



Related Technology

Fortunately we have acquired state of the art technology and related core competencies that will enable us to enter other segment as global situations change. These other segments include:

- * Space commercialization increases the use of satellites and launch systems, where our technology is strong.
- * Automation is also expanding in other fields such as the automobile industry.
- * Other areas include communication technology and fiber optics.

In short, even though the defense electronic market place has entered a more competitive and demanding period our core competencies will provide us with strategic advantages.

Our Business and Product Description

The Industry

The Defense Budget Project, a Washington think tank, predicts that defense spending will fall by 13.6%, to \$261 billion, by 1995, and to perhaps 225 billion by 2000. {BW2}

Economic Forecaster DRI/McGraw Hill predicts that perhaps 1 million defense related jobs could vanish between 1989 and 1995, including 830,000 in the private sector, or 20% of all jobs in the defense related industries. {BW2}

2nd & 3rd tier suppliers will also be affected. In a recent survey of 120 of it's M-1 subcontractors, General Dynamics found that 15% would have to close a plant if production on the tank program was ended. "Everything we do is designed for a life and death situation", said an executive of a subcontractor, "if we were to build a commercial product it would probably be overpriced by 5 or 6 times". The Aerospace industry is cutting back its supplier base by selecting those suppliers that are improving their operations, said another. {NYT6}

Hypothetical's Mission

Our mission was formed, as was many other alternative sets, by first brainstorming without critique. The following list was quickly generated.

Technological Leadership
Leaders in Innovation
Good Community Relations
Minimization of Layoff
Changing Business Focus

Well Being of Employees
Utilize Core Competencies
High Quality Products
Good Working Environment

Make a profit?

Later in the project cycle we had a better formed opinion of what kind of business we were pretending to be. Discussion lead to agreement on these premises for a mission.

The mission of Hypo Org. is formed of the following intentions. We intend to preserve the affiliation of our employees and stockholders. Our products will continue our traditional strengths of quality, reliability and technological leadership. Our reputation of being considerate to the community and environment will not be tarnished.

To Fulfill these goals we will migrate away from our previous reliance on the defense industry. We will begin to steer our core competencies such that revenue can be collected from commercial markets where we can define a competitive advantage. We desire that this retargeting will allow continued employment for the people who are Hypo. Recognizing that jobs may be redefined training will be provided. At worst we will minimize to the best of our ability the consequences of the cutbacks on our folks.

In this project we assume that our organization has the perspective of a moderately large national enterprise whose major emphasis is and has been, in the area of defense contract fulfillment. The revenue for fiscal year 1990 is about \$4 billion. Approximately 80% of our current business is specialized products that are subject to rapid technological change.

The Product and the Fit

Our basic strategy is to understand customer requirements thoroughly and then meet or exceed them every time. Our interest is to be the leader in high technology. This is reflected in our R&D activities and budgets.

We believe the investment would be rewarded in terms of future contracts. The company currently operates in the following principal business segments :

- ELECTRONICS AND MISSILES** The company is engaged in the design, development, and production of:
Missiles and missile launch systems

Electronic systems for precision guidance and air defense programs.

The technologies that we have utilized in this segment are computer based control systems, micro electronics, and fiber optics.
- The company also designs and produces **AVIONIC SYSTEMS**. We have been a major supplier to Boeing, Fokker, McDonnell Douglas, and Airbus. The technology supporting this segment includes computer based control systems, fiber optics and sensors/actuators.
- COMMUNICATION EQUIPMENT** includes designing the circuits and equipment for satellites and telecommunications. Technology supporting this segment is fiber optics and telemetry.

Sales in Millions	1990*	1989
Electronic & Defense	2,270	2,172
Avionics	825	790
Communication	1,031	987
Total	4,126	3,949

* 1990 Forecasted

Market Environment

The Market Potential

Environment. Our market is basically targeted to the prime contractor for lots of defense projects. Today our business segments has entered a tougher, more demanding period. The company's long term strategic approach for some years has factored in the cyclical nature of federal budgets.

P.M. Revenue Requirements

RELATION TO GOVERNMENT SPENDING
(Dollars in millions)

	sales	earnings	margin
Missiles and electronics	\$2270	250	11%
Avionics	\$825	83	10%
Communication	\$1031	113	11%
Total	\$4126	446	11

HYP0'S PERCENT OF SALES TO GOVERNMENT

Segments	Sales	Government Sales	Percent
Missiles and electronics	\$2270	\$1816	%80
Avionics	\$825	206	25%
Communication	\$1031	464	45%
Total	\$4126	2486	60%

To consolidate our opinions as to the amount of the cutback we assumed a set of values for spending in 1995 and allowed every one to apply a weighted rank. Then we simply averaged the weights. Refer to the Graphic describing the Defense Plans.

Strategic decision group Estimated government Cutbacks

\$360	3%	10%	5%	10%	5%	7%	\$40
\$320	40%	20%	20%	40%	45%	33%	\$106
\$280	55%	40%	70%	40%	45%	50%	\$140
\$265	2%	30%	5%	10%	5%	10%	\$28

Expected Value 1995 budget in \$billions
Weighted Average \$297

cutback over current plan for 5 years,
considering inflation 18% 82%

total cutback over 5 years,
without considering inflation 1% 99%

REINVESTMENT calculation

	'90	'91	'92	'93	'94	'95
plan						
Missiles	\$1816	\$1889	\$1964	\$2043	\$2124	\$2209
Avionics	\$206	\$214	\$223	\$232	\$241	\$251
Comm.	\$464	\$483	\$502	\$522	\$543	\$565
Total	\$2486	\$2584	\$2689	\$2796	\$2908	\$3027
forecast						
Missiles	\$1816	\$1671	\$1537	\$1414	\$1301	\$1197
Avionics	\$206	\$190	\$174	\$160	\$148	\$136
Comm.	\$464	\$427	\$393	\$361	\$332	\$306
Total	\$2486	\$2287	\$2104	\$1936	\$1781	\$1638
net funds to redistribute						
Missiles	\$0	\$218	\$427	\$629	\$823	\$1013
Avionics	\$0	\$25	\$48	\$71	\$93	\$115
Comm.	\$0	\$56	\$23	\$161	\$210	\$259T
Total	0	\$298	\$585	\$861	\$1127	\$1386
Percentage	0%	12%	22%	31%	39%	46%

From this table we can see that there is possibility that our sales will fall by as much as 46% to \$1.4 billion per year by the end of 1995.

Competitors

The defense missiles industry has several types of companies. Some of them have been very mature and have more advanced technology. Some of them are fortunate in that they are well diversified. Others have been less fortunate and have left the industry.

More specifics follow

Contractors Diversified

General Electric; OK because of size and diversity. {BW1}
 Boeing Co. OK because of size and diversity. {BW1} So far this year Boeing has announced orders for 219 jetliners worth \$18.9 billion.
 Rockwell; Aggressive expansion into industrial automation and commercial Aircraft avionics. Converted B-1 bomber hanger to service facility contracted to Federal Express and possibly Japan Air Lines. Non-Defense Sales to 75% up from 50% in 1986. {BW1}

Strategy appears to be Maintenance and cutbacks

McDonnell Douglas; Number 1 defense contractor; attempted diversification but lost \$343 million on computer services business. Counting on new MD-11 Passenger Jetliner to offset cutbacks, but 6 months behind schedule. Loses funding next year on fighter planes and helicopters, expects big layoffs. {BW1} Announced expected layoffs of 10-15,000 employees to achieve is goal of \$700 million savings for the St Louis based company currently employing 130,000. {ZOrg3} Moody's Investor Service reviewing the MD's Dept Ratings. {NYT4}
 General Dynamics; may mothball tank Plants in Michigan and Ohio.
 Raytheon; Makes missiles, navel electronics and fire-control. Moody's Investor Service reviewing the MD's Dept Ratings. {NYT4}
 Grumman; attempted diversification by making defective busses.
 Hughes Aircraft Co.; Joint marketing agreement with Hewlett Packard to sell civilian version of tamper proof PC's to banks, insurance companies etc. {BW1}

Texas Instruments
Martin Marietta
LTV

Litton: Makes guidance and electronics systems and builds ships.
Moody's Investor Service reviewing the MD's Dept Ratings. Dirk Koerber Litton's Vice President of investor relations thinks the company is doing very well, " Our shipyard has 4-5 year backlog. Our defense electronics business is made up of more than 300 programs , so we have an outstanding spread of risk." {NYT4}
LockheedCorp Major Restructuring, Earnings Low, Layoff 9,500.
Moving skunk works to Georgia, where lower cost of living, and less environmental restriction than California will reduce costs and workforce. {BW1} Prime supplier of satellites aircraft and surveillance systems Moody's Investor Service reviewing the MD's Dept Ratings. {NYT4}

Abandoning Market

Ford Motor Co. Possible sale of aerospace subsidiary to Loral Corp.

{BW1}
Honeywell; trying to sell, few buyers. {BW1}
Chrysler; trying to sell, few buyers. {BW1}
Varian; trying to sell, few buyers.

Other Competitors

Nissan Motor: Growing Aerospace Business Bought Star Wars Software. Software analyzes rocket exhaust gas. {NYT5}
Mitsubishi Heavy Industries: Japans largest military contractor. Bought Star Wars Software {NYT5}
Ishikawajima-Harima: manufactures Japans jet engines and rockets. Bought Star Wars Software. Say it will use in conjunction with development of space station module {NYT5}

SWOT Analysis

Threats

seems safe enough!

Where are we today (Includes impact of threats from external environment) ✓

We are prime contractors for lots of defense projects and have earned the respect of the government and the competitors alike. The main problem is that the defense industry budget (pie) is shrinking but not the number of players in the market. The budget could be cut by as much as 25% by 1995. This would lead to cut throat competition in the near future for limited new projects and cutbacks in the existing projects. The government might put production type projects on hold, but continue with the projects that need some more research and development.

The company used to spend massive amounts on R&D even before the contracts were awarded. This was because, we were certain that the investment would be rewarded in terms of future contracts. Now, with the changes in the situation, we would not spend dollars on future anticipated projects. The risk of operating in the defense industry today has increased tremendously due to the recent political developments in Russia and Eastern Europe.

The American people have become increasingly critical of the way money is spent by the defense industry. In the past, lot of projects were approved, some of which now seem redundant. e.g. we have stealth bombers but we also have mobile launch pads for ICBM's and we have submarines with nuclear missiles, etc. The government would find it increasingly difficult to justify large increases in defense budget. This would also adversely affect our industry.

Summary: The future seems to be saying loud and clear,

CUTS!! MORE CUTS !!! AND MORE & MORE CUTS !!!!! ✓

Where would be five years from now?

We would be left with a lot of idle capacity in our R&D labs and also the production shops in the future. If we do not change our ways of doing business, i.e. still depend on the defense industry for business, our sales revenue could potentially drop by as much as 50% {Gen Dynamics} in the next five years after we have exhausted our backlog of orders. We would have to layoff lots of employees to keep costs of operation under control, which is directly against our long term policy and mission. The company's mission clearly states our commitment to employee welfare and community relations.

Do we like the possible future scenario of our company?

No. We would not like to see our company reduce to half its size and layoff thousands of its employees. This would have a significant negative impact on the employees and the neighboring communities, where people are solely dependent on us for their livelihood.

Ideally speaking, we would like to maintain our present growth rate and retain the entire work-force. But, realistically speaking, it would be impossible to achieve the ideal goal. Many of the skills have a very narrow range of possible application.

So, What do we do? ○

1. We would look at our company and try to assess realistically our real strengths. We would like to call these strengths as our core competencies. ✓

Core competence:

A core competence provides potential access to a wide variety of markets. It should make a significant contribution to the perceived customer benefits of the end product. A core competence should be difficult for a competitor to imitate. {HBR1}

For example, Cannon has used its core competencies in Fine optics and micro-electronics to produce diverse products as cameras, copiers, fax-machines, laser printers and even semi-conductor equipment. Its core competencies enabled it to compete directly against the might of Xerox and emerge victorious.

Strengths

Our strengths are as follows

- a) Technological edge
 - b) Solid reputation for high quality
 - c) Superb relations with employees
 - d) Sound financial base.
- e) We have acquired the state of art technology in the following areas:
- i) Computer based control systems: Controlling the missile after it is launched requires a sophisticated computer based control system. This is also the case in the avionics of an aeroplane.
 - ii) Micro-electronics (semiconductors): The company has been a major player in the defense avionics and communications industry. It has developed expertise in designing and manufacturing 'mil-grade' (conforming to military specifications) semiconductor components.
 - iii) Fiber-optics: The company does not manufacture fiber, but produces opto-electronic components and equipment, e.g. opto-couplers, data-links, test equipment, etc. This expertise was acquired while working on the FOG-M (Fiber Optic Guided Missile) project and setting up fiber-optic data links for US Navy's air launched weapons.
 - iv) Sensors/Actuators: These are used extensively in the avionics industry. Monitoring the various parameters (using sensors) of a plane in flight and enabling the actuators to control/change the parameters.
 - v) Communications equipment/Telemetry: We have been active in designing communication circuits that go into military satellites. The company also designs communication equipment to track satellites (Ground stations). b) Even though the defense industry has strict and high quality requirements, not all companies have been able to maintain the highest standards. Definition of quality includes meeting project deadlines, minimal cost overruns, etc.
- f) We firmly believe, people are our real asset and our commitment to this cause has helped the company to be successful. The company is banking on this strength to solve the present crisis.
- g) The company has a large order backlog which proves the trust of the government and the defense industry in us. Also, our operations have been reasonably profitable in the past, largely due to the cold war between the two super-powers. This has helped us establish a strong financial base.

a) ?

2. Once we have identified our core competencies we would also like to appraise our weaknesses. This would help us identify possible future courses of action.

Weaknesses

Since, we have concentrated mainly on the defense industry, we have some inherent weaknesses as related to the commercial market. These are as follows:

- a) Product distribution networks
- b) Limited marketing and sales expertise
- c) Time to market
- d) Entrenched corporate culture.

a) Since, we had only three customers, (Army, Navy and Air-force) there was no need of distribution channels, the way we have in the commercial market.

b) The marketing expertise required to do business in the defense industry is strong lobbying in the Congress and Senate. We hire retired professionals from the defense industry as our consultants who are well versed with the nuances of operation.

But the commercial market, we have to understand what the general consumer thinks. The likes and dislikes of the consumers are now affected by lifestyles, education, values, etc..

c) Defense companies take upto five times longer than the commercial companies to develop new products, according to Eric Bloch, Director of National Science Foundation. {ZBW1} The government would generally issue design specifications and the equipment should be designed to the specifications.

In the commercial market delay of a project by one year means missing the strategic window and significant losses in terms of market share, sales revenues, etc. H.P has vowed to reduce by half the time it takes to market products by year 2000. {Fortune3}

d) Organizational culture is a powerful and positive force when used to reinforce and support the strategy of the company, e.g. Sequent Computers Inc. could change the mission of the company easily because of its culture. Sequent shifted its focus from technical workstation computers to on-line-transaction-processing computers successfully.

On the other hand, an entrenched culture can also become an impediment to achieving strategic goals. This is especially true for our company, now that it should focus on the commercial market also, after being almost solely dependant on the defense industry.

3. At this point, we know the threats facing us, and our strengths and weaknesses. We can then identify the opportunities existing in the commercial market that can be tapped with our resource base. We would also know whether we need to acquire any additional competencies in order to pursue these opportunities. We stress commercial markets because we want to have a well diversified portfolio of markets. This would help us reduce the risk faced by the company.

Opportunities

You bad!

The basic idea here is to look at our core competencies and identify opportunities that can directly relate to our strengths. Some of the opportunities that exist in the commercial market are: ✓

a) Robotics: ✓

Robots require a complicated closed loop control system generally micro-processor based. The controller takes in the parameters from the various sensors as its input and then controls by energizing certain actuator assemblies in the robot. Avionics subsystems have a lot in common here with applications in Robotics.

The market would continue to expand for robots as more and more processes are automated. A special mention is recent developments in the Eastern Block countries. There is a large potential there.

Nuclear Industry: ✓ b)?

The expertise of computer based control system can also be utilized in a nuclear power plant. The energy requirements would increase to an extent in the future, where only nuclear energy would provide a viable alternative.

b)Fiber-Optics: ✓

Inter-office networks, data communications and laying down fiber optic cable to bring extended cable television services closer to home are some of the areas that are expected to grow very rapidly in the near future. The experience from setting up data links for Navy, communicating with a fiber- optic guided missile can be directly put to use here.

Core competencies utilized: Fiber optics, micro-electronics and communication equipment.

c) Satellite communications: ✓

Instant communication between vastly separated areas would prove to be a competitive edge for the company who utilizes the benefits, e.g. instant communication for extended customer service, coordination of strategy thereby reducing the decision making delay. Mobile communication, direct broadcast systems, etc. are some of the other opportunities that can be addressed by satellite communication.

Core competence utilized :

communication modules in the ground stations and satellite's transponder for military communication. Telemetry, computer control system and missile guidance system to monitor and control the position and the orientation of the satellite.

d)Expendable launch vehicles: ✓

Setbacks in shuttle operations have caused a massive backlog of commercial satellites that have to be launched in the near future. This has created a strong demand for commercial launch vehicles.

Core competencies utilized: expertise acquired from designing, developing and manufacturing guided missiles and the control system.

Implementation

The present external environment calls for a big change in the company's mission itself. By this, we mean that the company would have to change its business strategies, policies and practices. The company would have to change its focus of operations.

This means, we would have to change the way we conduct our day to day business. Instead of having one customer, i.e the government, our company would now have to be adept at handling likes and dislikes of the general market.

So far, the company could sell products on a cost plus basis, but now the pricing would be decided by the market and not the cost. In the defense industry, completing a project to its specifications, as set by the government would assure the contractor commercial success. This would not hold good any more in the commercial market place. The specifications would keep changing as desired by the consumers. We would have to try to be responsive to their whims and fancies. Instead of having, three or four competitors, the company would now have to face numerous competitors.

Listed below are some of the major issues, in brief, that the company's top management would have to address. This would help achieve desired results in the new setting.

a) Communications:

The minds of the work force would be filled with apprehension, doubts and fear. This is because they only see the black clouds looming over the organization. They should receive clear, accurate and precise communication from the top. The information that the employees want is in which direction we are headed to, what is the company's response to the changes, etc.

The management can have regular meetings with its employees and help them understand the general course of action. The only thought that comes to the mind of employees in such a situation is "Layoff." The management should try to dispel these doubts and make it clear that layoffs would be the absolute last alternative. It should also make it very clear that some layoffs would be unavoidable. This would help reduce confusion and give the employees at least a general sense of direction.

In our opinion, this would help the management get the support of its employees. The ideal model would be like a family, where father is discussing a grave situation with his kids and wife.

b) Cultural change:

AT&T's new chairman, Robert Allen after taking charge of the company went through profound introspection. His conclusion: For AT&T to succeed, its culture must finally change-and so must he. {Fortune}

Our company would also have to change its culture and this change has to start from the very top first. This would percolate down the rank and file and help align the culture to its new strategy.

c) Structure:

The organizational structure would have to be modified. Core competencies would be shared across different projects, e.g. both Robotics and Nuclear Energy projects would require people with control systems expertise. A matrix kind of an organization would be helpful in developing different projects yet retaining and enhancing the core competencies.

d) Training:

The period ahead would require massive training of employees so that we can utilize their existing skills and also help them acquire additional skills required for the new projects.

Employees that would be laid off should be encouraged to use any existing resources available at the company to retrain themselves for the new future outside the company. The company should provide assistance in helping them look for a job. Many companies have provided counselling services, (AT&T) computers for resume preparation and instructors to help hone interview skills for employees that would be laid off. They should be given severance notices well in advance, so that the employees have ample time to prepare for the uncertain future ahead.

e) Costing system:

The company's pricing for defense projects was based on a cost plus basis, i.e. the government would give a certain percentage of the cost incurred as profit to us besides paying for the cost incurred. This system would not work for the commercial market place.

The company would have to be careful with the costing system so as not to "peanut-butter" the overhead of one division over another division's products. This would give a totally different signal to the management. As a result, potentially successful projects would be sidelined in favor of less commercially attractive projects.

The new manufacturing accounting system (cost management system) should let the company make production decisions as business decisions {HBR2}

f) Marketing capability:

This covers different related issues, e.g. sales organization, distribution channels, customer service centers, etc. The company would have to address these issues on a war footing basis.

g) Manufacturing:

The existing manufacturing setup is ideally suited for low volume, high quality production. It should now change to a high volume, high quality production. This calls for a different ball game altogether.

Use of Statistical Quality Control procedures is recommended. This would help bring about a social change in the manufacturing organization. By this we mean, that the number of inspectors should go down and the number of machine operators should increase. The increase in the number of machine operators is offset by the increase in the quality {HBR2}

A new concept is emerging in manufacturing, called Systems approach. In a nutshell, it means that "Producing does not stop when the product leaves the factory. Distribution and Services are integral parts of the process." {HBR2} Instead of implementing engineering, manufacturing and marketing as a series of steps in the manufacturing business, the system is complemented by a parallel team organization. This team brings various function together, from conception of a new product idea or process project.

Every business decision should meet manufacturing's requirements and needs and in turn should exploit its strengths and capabilities of a company's particular manufacturing system. This would help achieve a competitive advantage in the long run.

CONCLUSIONS AND RECOMMENDATIONS

Significant business opportunities exist for OURCO to continue profitable growth in the business areas that were investigated. Evaluation of the potential business using both financial and risk management analysis tools led to the results in the following table:

	ROBOTS	NUCLEAR ENERGY	<i>space</i> FIBER OPTICS	SATELITE COMM.	SPACE VEHICLES
NPV (\$mm)	12.2	1.1	65.5	51	11.2
IRR(%)	19.2	13.5	20.8	18.4	13.4
PAYBACK (yrs)	5	7.5	7.5	6.8	8.3
HDM	.0334	.0275	.0612	.0561	.0272
Investment Outlay	414	11	105	244	310

From where?

seems low

The table highlights both NPV and HDM comparisons. Comparison of the NPV values indicates a wide range which for the Nuclear industry reflects both the high start up costs and the long time before revenue is available. The extraordinarily high NPV of the Fiber Optics area is a direct result of leveraging from existing technology, resources and markets, much of this product is close to existing product in design technology and physical configuration. The NPV of Satellite Communications results from high market growth ranging up to 40% in selected years. The high start up costs for the Nuclear industry are reflected in the low NPV while conservative estimates of market share and market growth are reflected in the low market share numbers. These financial indicators point towards the fiber optics and satellite communications business as potentially attractive business areas.

*OK,
I see.*



The HDM indicators combine both the project selection criteria as well as the likelihood of the scenarios for future world events that were considered. Both the fiber optics and the communication satellite areas are indicated as selections by these indicators. This agrees with the financial indicators for these two projects. In addition these two projects are grouped together well above the preference for the remaining three areas. These three areas include nuclear energy which requires significant additions to our competencies in the area of nuclear engineering.

In all cases it appears that the NPV and HDM evaluation identify the same sequence of projects for implementation. To some degree this is not surprising since the HDM includes the impact of NPV as part of the evaluation criteria. With both of these guidelines in agreement the project selection becomes much more dependent upon availability and cost of capital. Consideration of MCC (Marginal Cost of Capital) and IOS (Investment Opportunity Schedules) lead to the conclusion that Fiber Optics, Satellite Communication and Robotics are the business areas that will meet our IRR requirements. Nuclear energy and launch vehicles were eliminated because the IRR were lower than the marginal cost of capital at approximately \$770 million of capital requirements. The following figure shows the relationship for all projects.

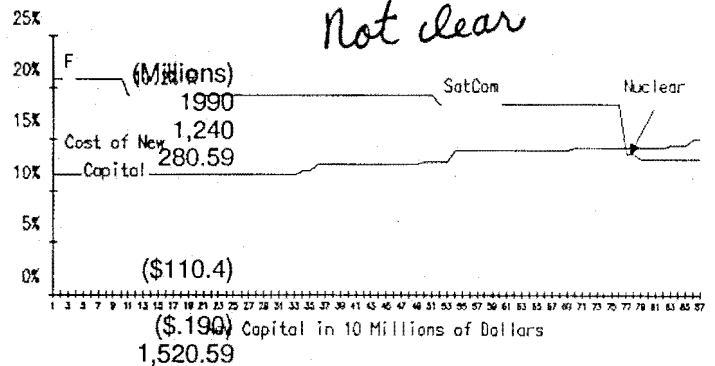
Refer to the appendix on capital budgeting analysis.

Statement of Retained Earnings

Beginning balance
 Net Income
 Cash Dividends per share

 Common
 (69 million shares at \$1.60/share)
 Preferred
 [40 thousand shares at \$4.75/share]
 Ending balance

MCC and IOS schedules for Hypo



MCC figure

NOTE: All HYPO's existing capital was raised in the past and all of it is invested in assets which are used in operations.

Statement of Debt Structure

Our capital structure is as follows:

Debt	35%
Preferred Stock	15%
Common Stock	50%

New Capital required for all projects will be \$862 million during their lifetimes.

DECISION ANALYSIS

The decision making process was necessary to select business(es) that will help the company to survive from current crisis of weakening business due to defence budget cut. The selected businesses would lead the company with sustainable competitive advantage through the effective use of its core competencies. This kind of business selection required a multicriteria decision analysis.

Mission Criteria

Criteria that are important to realize the company's mission

1. Maximizing financial wealth of the shareholder
2. Maintain sustainable competitive advantage
3. Maintain employee welfare
4. Maintain good community and environment relations

The four criteria above are within the control of the company and we call it internal factors. There are external factors beyond the control of the company that have significant impact. These external factors will also affect the probability of success and should be considered in the market selection process.

Scenario Analysis

After familiarizing themselves with the situations important to Hypo's business. The group used a brainstorming session to identify some external factors that could have significant impact on the operations of the company. They also designated some impact observations on each business, and found that common effects would allow consolidation to six scenarios.

These Scenarios are :

- + SatCom (S1) Threat of war increases. There are still many
- + Rockets instabilities.
- + Nuclear
- ~ Automation
- ~ Fiber Optics

- SatCom (S6) Deficit and Bank Failure and Defense Cuts all hit an already weak economy and recession occurs.
- Rockets
- ~ Nuclear
- Automation
- Fiber Optics

- + SatCom (S3) The east Europeans become greater competitors faster than we have predicted. Because of similar effect on the markets of our choice the following scenario was related with this one and the next. Global politics leads to significant reduction of trade barriers.
- + Rockets
- Nuclear
- + Automation
- + Fiber Optics

- + SatCom (S4) The competition coming from the Pacific nations increases beyond our expectations due to increased cooperation or reduction of trade barriers.
- ~ Rockets
- ~ Nuclear
- Automation
- ~ Fiber Optics

- + SatCom (S5) Global Warming is found to be a direct effect of the increase oxidation of fossil fuels. Because the effects were similar on our selected markets we included a second scenario into this cluster. That being that gasoline prices will jump up sharply again.
- + Rockets
- ~ Nuclear
- Automation
- + Fiber Optics

- ~ SatCom (S2) Defense Cuts were much greater than expected
- ~ Rockets
- ~ Nuclear
- + Automation
- + Fiber Optics

- + SatCom Several major Diseases are cured. The increased population and longevity affect the quantity and characteristics of goods and services. Included in this cluster was the scenario where a new paradigm for the redistribution of wealth was discovered behind socialism and capitalism. Socialism can't motivate the organization and Capitalism can't find what's in it for the individual. Someone figures out how to sell things to people who need them but have no jobs and create nothing of interest.
- ~ Rockets
- + Nuclear
- + Automation
- + Fiber Optics

yes

Education and communication accelerate the change in technology. This scenario as well as the previous one was eliminated because they had insignificant differential effect among competitors in our industry. To aid in the objective analysis of the various scenarios we generated the following method by which we ranked them relative to the impact on each business.

- 1 = big negative impact
- 2 = small negative impact
- 3 = no impact
- 4 = small positive impact
- 5 = big positive impact

The relative probability of occurrence of the external factors (state of the nature) was assigned by Hypo using the PCM method. The impact of each state of nature on each business was calculated by multiplication of the relative probability of occurrence with its impact level to the business. The sum of the impact of each state of nature on the business provided the overall impact of the external factors. Then, the overall impact values were normalized and used as the base of Strategic Confidence & Opportunity criteria in the HDM process. The following table provide a more detailed look at the analysis.

Scoring Table
State of nature

	S1	S2	S3	S4	S5	S6	Score	Score
Subjective prob.	.24	.75	.60	.54	.39	.48		Norm
Business								
Robotics	4	5	3	2	3	1	9.24	0.20
Nuclear Control System	3	4	1	3	5	3	9.33	0.21
Satellite Communication	5	1	2	2	3	1	5.88	0.13
Fiber Optic	3	3	5	4	4	2	10.65	0.23
Enhance Launch vehicle	5	3	4	4	4	2	10.53	0.23

The scenarios were consolidated to a single number using subjective probalistic methods. This single factor was called Strategic Confidence & Opportunity, and integrated well into the HDM analysis to follow. However we recognized that if we we developing action programs rather than doing decision analysis, probalistic methods may defeat the purpose of scenario analysis.

Hierarchical Decision Modelling

There are several methods involving multicriteria decision making that can be applied in business selection such as

1. Multi Attribute Decision Making
2. Analytical Hierarchy Process
3. Hierarchical Decision Modelling

Hypo company choose Hierarchical Decision Modelling (HDM) {HDM} as the tool to assist the selection of businesses under consideration. HDM was chosen because it relates individual businesses using multiple criteria as well as different perspective viewpoints. In other words it allows integration of the top down requirements as well as the relative contribution of each business unit.

The HDM method requires assessment of importance weights. The usage of the Pairwise Comparison Method (PCM) provides the necessary tool for that purpose. It measures the consistency of the individuals as well as highlights differences among those in a group. The relative weighting of the criteria is displayed below.

Criteria	Relative weight
(N) Net Present Value	0.24
(C) Community and Environment	0.10
(E) Employee Welfare	0.13
(A) Strategic Advantage	0.35
(O) Strategic Confidence	0.18

Evaluating the relative value of the business

- criterion

The matrix of relative importance of each business for each criteria (with constant sum equal one) was developed using the PCM method. The value of the Strategic Confidence & Opportunity was taken from the scoring table. The complete matrix can be seen below.

OBJECTIVES > BUSINESS	N	C	E	A	O
Robotics	0.09	0.20	0.10	0.25	0.20
Nuclear	0.01	0.10	0.40	0.10	0.21
Sat. Comm.	0.36	0.40	0.20	0.25	0.13
Fiber Optic	0.46	0.20	0.25	0.20	0.23
E. Launch V.	0.08	0.10	0.05	0.20	0.23
SUM	1.00	1.00	1.00	1.00	1.00

This matrix multiplied by the value of each criteria gave the relative value of the business from the business point of view. The result can be seen below.

Value of Business

BEFORE Scale Correction

RANK	RELATIVE Score
1 Fiber Optic	0.275
2 Sat Comm	0.264
3 Robotics	0.177
4 Nuclear	0.147
5 E. Launch V.	0.137

*Assumes
multiplicative
model*

Evaluating the relative contribution of the business to the company objective

At this step, the relative contribution of each business to the company objective was developed with the PCM method. The resulting number form the following matrix. Then, the scale correction was done for each of the business and the resulting matrix was normalized. This processes were repeated for each of the businesses.

Business Impact on ALL Strategy

OBJ. BUSINESS	N	C	E	A	O	SUM
Robotics	0.10	0.10	0.30	0.30	0.20	1.00
Nuclear	0.10	0.30	0.30	0.20	0.10	1.00
Sat. Comm.	0.30	0.10	0.20	0.30	0.10	1.00
Fiber Optic	0.25	0.20	0.20	0.20	0.15	1.00
E. Launch V.	0.15	0.10	0.20	0.25	0.30	1.00

Finally the average value of the normalized matrices multiply by the relative weight of the objectives gives the relative value of the contribution of the business to the company objective. The result can be seen below

Value of Business

AFTER Scale Correction

RELATIVE

RANK Score

1 Fiber Optic	0.0612
2 Sat Comm	0.0561
3 Robotics	0.0334
4 Nuclear	0.0275
5 E. Launch V.	0.0272

Sensitivity Analysis

When using numerical methods to aid in decision based on assumptions of the future and subjective information sensitivity analysis becomes more important. Since we can never expect perfect information about the future, sensitivity analysis will provide us with the necessary tool to make wise judgements. We will, with certainty, know the range of estimation that will not affect our decision.

By knowing what information should be acquired we can make better use of our resources and time. Sensitivity analysis helps us focus on that which is necessary

Of the 5 original criteria, we considered the following parameters to be based on our business philosophy and therefore relatively stable.

- Community and Environment
- Employee Welfare
- Strategic Advantage
- Strategic Confidence

So we focused our attention on economic factors represented by the NPV parameter. The result of the sensitivity analysis of Hypo company is shown below.

The range in NPV numbers was not practical. So we converted the values into a more informative representation. Since changes in market potential, cost and market share of each plan all affect the plans in the same manner, we would like to name this economic factor.

	NPV dec-inc.		Economic Factor dec-inc	
Business				
Fiber Optic	20%	no limit	7%	no limit
Sat. Comm.	90%	20%	17%	4%
Robotic	90%	420%	39%	183%
Nuclear	30%	2000%	3%	190%
E. Launch. V	100%	10%	10%	1%

Sensitivity analysis would help us identify the critical economic factors. By this we mean, which economic factor can change the status of a project from being an accepted one to that of a rejected one.

Results of Sensitivity Analysis:

Among the accepted businesses, Satellite communication is the most sensitive to the economic factors. A change of 19% in the economic factor can change the status to a rejected project.

Fiber Optics seems to be pretty robust and can withstand a 31.99% error in the forecast, i.e. if the market forecast is 31.99% lower than projected, it would still be accepted. Only, if the forecast is lower by 32%, we would reject fiber optics.

Among the rejected businesses, if we can improve the economic value of Nuclear industry project by 6%, we can include it in our business portfolio. This would increase our overall NPV to \$130.31 m.

Also, if the Expendable Launch Vehicle project could improve its performance by 12%, we can include it in our overall portfolio and take our overall NPV to \$152.64m.

Sensitivity Analysis provides a vital clue as to which factors are critical for the success or failure of a project. The organization should pay special attention in determining an accurate forecast for these parameters.

Reviewing the scenario analysis. Although it is also beyond the scope of this document, we feel that the individual business units should use sensitivity analysis in formulating their tactics. Do not consider twiddling the subjective probabilities that were applied to form the expected value which we called strategic confidence & opportunity. But rather what if each occurred. This would redefine the entire decision model. Thus we should have contingency plans in place for all the events. And remember that planning is often event driven. No plan no matter how well modelled will last forever.

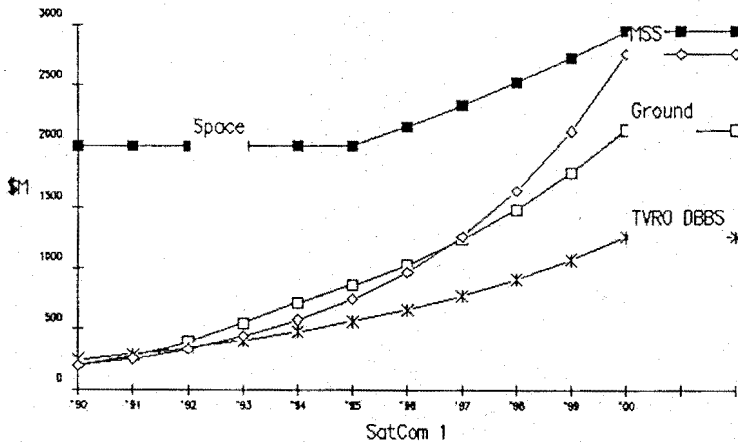
SATELLITE COMMUNICATION INDUSTRY MARKETING ENTRY PLAN.

Satellite Communication System

This market consists of two segments, the space segment and the ground segment. The market size for space segment in 1989 was around \$2 billion. This market will stagnate, but in mid 1990's it is projected to resume growth at the rate of 8% per year. The market size for the ground segment was around \$750 million in 1989 with projected growth of 25% for the year 1990. The primary growth for the ground segment will be from three areas; the Very Small Aperture Terminal (VSAT) market, the Television Receive- Only (TVRO) / Direct Broadcast market, and the mobile satellite market. On the other hand, the sales of earth station for broadcasting and CATV application will decline from \$240 million to \$170 million in 1994 as this product reaches the maturity phase of the product life cycle.

Satellite Communication will fit with the current core competence of the company. This market is very potential to be one of the major business of the company.

Market Potential of 4 Segments in the Satellite Communication Industry



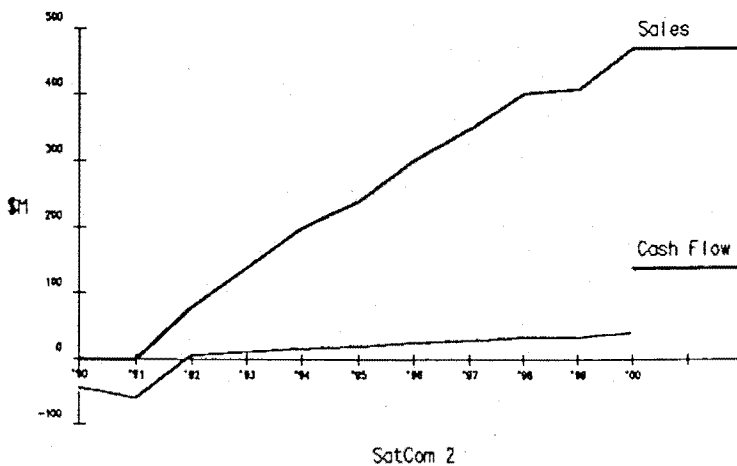
Space Segment

This segment market depends heavily on the availability of the launch vehicle. For the recent year, the growth for this market was stagnant because of the Challenger (space shuttle) disaster and because there was no viable launch alternative at that time. There are several launch alternatives available in other countries; Arianespace, the European space launch consortium, Chinese Long March from China and Proton from Soviet Union. But because of the political situation in the past, there were certain restrictions on the usage of the Chinese and Soviet Union launch facility.

The future growth of this segment will be influenced by the availability of the launch vehicles, new orders from Intelsat and foreign governments, new satellites services such as Direct Broadcast Satellite (DBS) and the introduction of mobile satellite services. U.S. satellite manufacturer still dominate in the satellite communications equipment and through mid-1990s. For international trade, they have contracted to build 8 out of 10 satellites for Luxemburg, Australia, Japan, United Kingdom and India. Intelsat also has ordered 9 satellites from U.S. manufacturers, with options for five more.

Many countries are investigating establishment of satellite systems. These countries including Thailand, Pakistan, Taiwan, South Korea, Argentina are considered potential customer. The domestic market projected orders of 29 to 33 satellites to seven U.S. satellite manufactures through mid 1990s. International competition for this segment will increase from European and Japanese companies. The Japanese manufacturers now are considered a minor competitor but projected to become a major competitor in the mid-1990s.

Space Segment Market Entry Plan



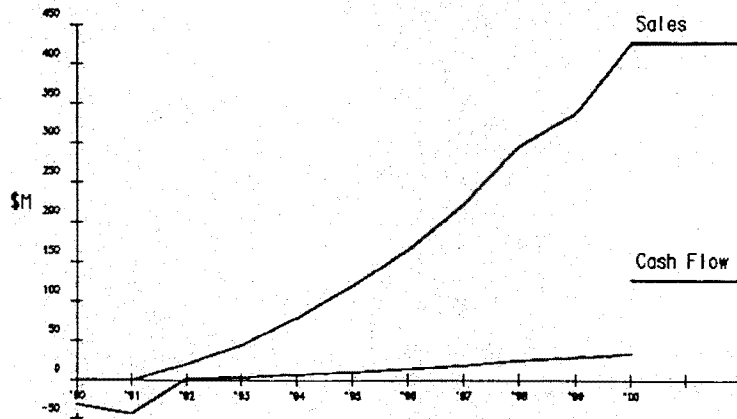
Ground segment

The ground segment will grow faster than the space segment with some of its subsegments projected to reach a growth rate of 25 to 40% in 1990. Although some of its subsegments such as the earth station for broadcasting and CATV, will decline, the overall growth for this segment is projected to reach 25% in 1990. Based upon the industry attractiveness, we will focus on the growing market.

Very Small Aperture Terminal (VSAT)

The size of this segment was \$193 million in 1989 and is projected to grow at the rate of 40% per year until 1992. Currently there are 30,000 to 35,000 VSATs in U.S. and this will grow to a projected 300,000 installed units. Currently about 90% of the installed VSATs are in the U.S. The European market is growing and is projected to reach 42,000 units by 1993.

Ground Segment Market Entry Plan

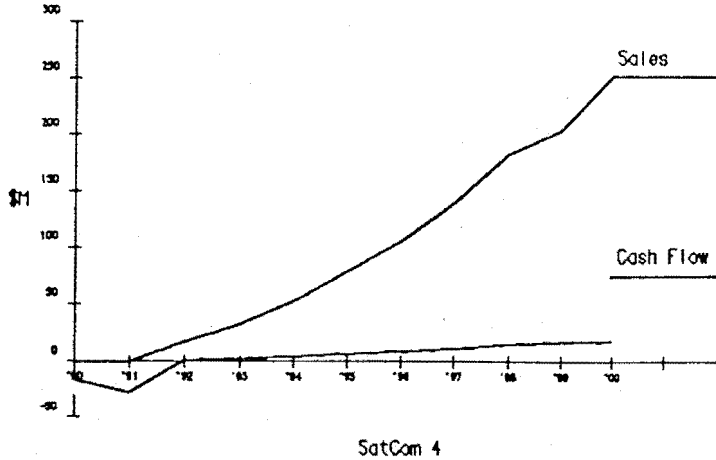


SatCom 3

Television Receive-Only (TVRO)/Direct Broadcast Market

The sales of TVRO in 1989 was estimated between 210,000 to 335,000 units with the market of \$250 million projected to grow around 15 to 20 percent per year. Total TVRO installment in 1989 was around 2.35 million. The European market is still relatively small but is starting to grow fast because of the launches of British BSB and Luxemburg Astra DBS in 1989.

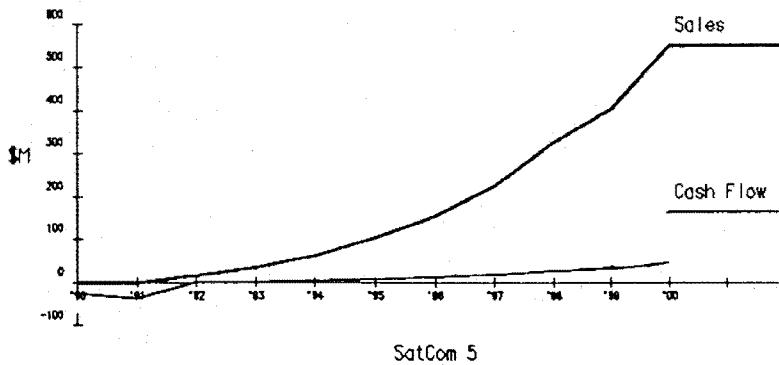
TVRO & DBBS Market Entry Plan



Mobile Satellite Service (MSS)

This service is new. Ten thousand MSS tranceivers are projected operational by 1993 and will grow at the rate of 25% and will achieve 17,000 units installed in 1995. American Mobile Satellite Corporation (AMSC) plan to launch two satellites in 1992 and 1993. The antenna of this tranceiver can be easily mounted on boats, trains, planes, trucks and automobiles.

M.S.S. Segment Market Entry Plan



SPACE SEGMENT

Year	90	91	92	93	94	95	96	97	98	99	00
Market potential in Billions	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,160	\$2,333	\$2,519	\$2,721	\$2,939
Market Growth	0%	0%	0%	0%	0%	0%	8%	8%	8%	8%	8%
Market Share goal	0%	0%	4%	7%	10%	12%	14%	15%	16%	15%	16%
Sales	\$0	\$0	\$80	\$140	\$200	\$240	\$302	\$350	\$403	\$408	\$470
Gross Profit 38.8%	\$0	\$0	\$31	\$54	\$78	\$93	\$117	\$136	\$156	\$158	\$182
Operating Expense 29.9%	\$5	\$10	\$24	\$42	\$60	\$72	\$90	\$105	\$121	\$122	\$141
Operating Profit 8.9%	(\$5)	(\$10)	\$7	\$12	\$18	\$21	\$27	\$31	\$36	\$36	\$42
All Other Expense 1.7%	\$1	\$1	\$1	\$2	\$3	\$4	\$5	\$6	\$7	\$7	\$8
Profit (Loss) 7.2%											
Before Tax 40.0%	(\$6)	(\$11)	\$6	\$10	\$14	\$17	\$22	\$25	\$29	\$29	\$34
Taxes (40%)	\$0	\$0	\$2	\$4	\$6	\$7	\$9	\$10	\$12	\$12	\$14
After Tax	(\$6)	(\$11)	\$3	\$6	\$9	\$10	\$13	\$15	\$17	\$18	\$20
Depreciation	\$2	\$3	\$3	\$6	\$8	\$10	\$12	\$14	\$16	\$16	\$19
Initial Investment	\$40	\$50	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Worth											
Cash Flow	(\$44)	(\$58)	\$7	\$12	\$17	\$20	\$25	\$29	\$34	\$34	\$140
Net Present Value	\$13	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
IRR	18%										
Payback Period	6.80 years										

GROUND SEGMENT

VSAT (Very Small Aperture Terminal)

Year	90	91	92	93	94	95	96	97	98	99	2000
Market potential	\$200	\$280	\$392	\$549	\$713	\$856	\$1,027	\$1,233	\$1,479	\$1,775	\$2,130
Market Growth	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Market Share goal	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sales	\$0	\$0	\$20	\$44	\$78	\$120	\$164	\$222	\$296	\$337	\$426
Gross Profit 38.80%	\$0	\$0	\$8	\$17	\$30	\$47	\$64	\$86	\$115	\$131	\$165
Operating Expense 29.90%	\$2	\$3	\$6	\$13	\$23	\$36	\$49	\$66	\$88	\$101	\$127
Operating Profit 8.90%	(\$2)	(\$3)	\$2	\$4	\$7	\$11	\$15	\$20	\$26	\$30	\$38
All Other Expense 1.70%	\$0	\$0	\$0	\$1	\$1	\$2	\$3	\$4	\$5	\$6	\$7
Profit (Loss)											
Before Tax 7.20%	(\$2)	(\$3)	\$1	\$3	\$6	\$9	\$12	\$16	\$21	\$24	\$31
Taxes (40%)	\$0	\$0	\$1	\$1	\$2	\$3	\$5	\$6	\$9	\$10	\$12
After Tax	(\$2)	(\$3)	\$1	\$2	\$3	\$5	\$7	\$10	\$13	\$15	\$18
Depreciation 4.0%	\$1	\$1	\$1	\$2	\$3	\$5	\$7	\$9	\$12	\$13	\$17
Initial Investment	\$30	\$40	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Worth	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$91	\$0	\$0
Cash Flow	(\$32)	(\$43)	\$2	\$4	\$7	\$10	\$14	\$18	\$25	\$28	\$127

Net Present Value\$3

IRR 16%

Payback Period7.8years

TVRO/DBS SEGMENT

Year	90	91	92	93	94	95	96	97	98	99	2000
Market potential	\$250	\$294	\$345	\$406	\$477	\$560	\$658	\$773	\$908	\$1,067	\$1,254
Market Growth	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Market Share goal	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sales	\$0	\$0	\$17	\$32	\$52	\$78	\$105	\$139	\$182	\$203	\$251
Gross Profit 38.80%	\$0	\$0	\$7	\$13	\$20	\$30	\$41	\$54	\$70	\$79	\$97
Operating Expense 29.90%	\$2	\$3	\$5	\$10	\$16	\$23	\$31	\$42	\$54	\$61	\$75
Operating Profit 8.90%	(\$2)	(\$3)	\$2	\$3	\$5	\$7	\$9	\$12	\$16	\$18	\$22
All Other Expense 1.70%	\$0	\$0	\$0	\$1	\$1	\$1	\$2	\$2	\$3	\$3	\$4
Profit (Loss)											
Before Tax 7.20%	(\$2)	(\$3)	\$1	\$2	\$4	\$6	\$8	\$10	\$13	\$15	\$18
Taxes (40%)	\$0	\$0	\$0	\$1	\$2	\$2	\$3	\$4	\$5	\$6	\$7
After Tax	(\$2)	(\$3)	\$1	\$1	\$2	\$3	\$5	\$6	\$8	\$9	\$11
Depreciation 4.0%	\$1	\$1	\$1	\$1	\$2	\$3	\$4	\$6	\$7	\$8	\$10
Initial Investment	\$15	\$25	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Net Worth	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$54	\$0	\$0
Cash Flow	(\$17)	(\$28)	\$1	\$3	\$4	\$7	\$9	\$12	\$15	\$17	\$75

Net Present Value\$4

IRR 17%

Payback Period7.6years