OPIM 5604: BUSINESS DECISION MODELING

‘THE ERP DECISION’

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FINAL PROJECT REPORT

GROUP 6

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I. EXECUTIVE SUMMARY:

Mega Corporations is faced with a major dilemma as to whether to overhaul their entire IT system or lose ground to better organized companies in the market place. The discussion has escalated to the senior management and they are left with two choices: One which the CIO supports, which is to implement an ERP system whereas the CFO is against the idea of the entire implementation. This decision needs to be made in the face of tough competition and deteriorating market standings. Though the initial investment is considerable, the long-term benefits might lead to profits for the company.

Our job as a consultant is to show the 20-year roadmap for the company, and help the board take a decision as to '*whether the company should make this considerable investment or not*'.

To perform this analysis, we have considered a 20-year period, over which we have calculated the Profit, Return on Investment, and the Net Present Value of the profit. We have performed various analysis to find out how the effect of changing different parameters, and their ultimate effect on the profit. Finally, based on the stipulated hurdle rate, we have come up with a decision as to whether the company should go ahead with the investment on ERP systems, or ERP and CRM systems or continue as is.

We uncovered some *key insights* while performing our analysis. There are 3 references used for profit, ROI and NPV calculations. First, with the existing systems; Second, with ERP implementation; and third, with ERP and CRM systems.

Below are some of our **key findings** from the analysis:

- With a 8% more investment in ERP and CRM the business can expect to generate 60% more revenues than only from an investment in ERP
- The revenue growth % and the variable cost % have the most significant effect on the profit, ROI and NPV outcomes
- The fluctuation in Inflation plays a key factor in determining the Net Present Value of profits

- Given the current scenario, if we project the same for a 35-year period, the business in its current form will face considerable losses, whereas with the ERP & CRM Implementations, they are expected to enjoy huge profits
- Holding Rate and Average Inventory turnover does not have a significant effect on the profit
- The cost of maintaining old systems and the incremental cost attached with it would become a huge burden for the company in the future and that would be a key factor for its losses
- The company is expected to suffer huge losses for the first four years after its implementation of ERP and ERP with CRM
- Given the current scenario the company is expected to run into losses from the 16th Year in operation if they do not switch over to ERP or CRM systems

Our recommendation to the company based on our findings are as follows:

- In the future, the ERP and the ERP and CRM implementation will yield huge profits for the company. We **recommend investing in the project** for both ERP and CRM systems
- Y-o-Y revenue growth % has the most potent effect on the profits. The company should try to maximize is its revenue growth as much as possible
- The standard hurdle rate of 10% used for projects might be too high for this project. The company should consider reducing it keeping the long-term profits in mind
- The company should put immense focus on bringing down the variable cost as low as possible. It is the single biggest deterrent for the company to maximize the profits. The variable cost is very high at the start of the project

II. PROBLEM DESCRIPTION

A. PROBLEM ARTICULATION

The systems today at Mega Corp, do not allow cross communication between teams which leads to considerable loss of information. An implementation of the ERP will lead to data consolidation

and will optimize costs and communication throughout the company. This common platform will also help Mega Corporation analyze data from one single repository and use it for cost and effort optimization purposes for the company. Ideally, the new system should generate profits. To test whether the system will generate profits or not, we broke down the problem into 3 factors – Manpower, Financial and Technical. We kept the technical and manpower factors constant and performed certain simulations and analysis on the financial factors. We decided to make the rate of return our decision variable. The Outputs for our formulation were the Profit, ROI and NPV for the existing systems, systems with ERP implementation and the systems with the ERP & CRM implementation. We calculated the values over a 20-year period for each condition, and considered to project over a 35-year period, to determine the long-term impact of the implementation.

B. ISSUES TO BE ADDRESSED

- A definitive 'Hurdle Rate' of 10% is agreed upon to evaluate the success for the project.
- Huge upfront capital investments in the initial 5 years of the implementation
- The possible exodus of experienced employees upon the implementation of the new ERP and CRM system.
- The projected Sales Growth Rates/Year and the trade-off between implementing only an ERP system or both ERP and CRM systems.
- No prior experience and expertise within the company on the new technologies to be implemented.
- The cost to hire and retain new consultants and retraining cost for the entire organization.

C. ASSUMPTIONS

- Sales holds steady for the next 20 if ERP/CRM is not implemented; will grow at 1%/Year for next 18 Years if ERP is implemented and will grow at 3% Year for next 16 Years if both ERP and CRM is implemented
- Warranty costs for the next 18 and 16 Years considered within the ERP and CRM Software Investment

- Variable Cost is considered at 60%
- Demand and Cost of Consultants and programmers for ERP and CRM Systems as suggested by a subject matter experts
- Inflation i.e. the discount rate for NPV calculations are at 3%
- Maintenance cost of Existing Systems assumed at $ 500,000 with an yearly increment of $ 100,000

III. ANALYSIS AND BUSINESS INSIGHTS

(All amounts mentioned are in '000s of Dollars)

Findings	Recommendations
Over a 35-year period, the ERP & CRM will be the most profitable yielding a 35.7% ROI	Invest in ERP & CRM with a long-term goal for profit
Holding cost alone does not have a significant effect on profit	Keep holding cost low if possible
As the variable cost increases, the hurdle rate of return for both the ERP and the ERP&CRM decreases	Focus on efforts to significantly bring down the variables cost. An investment in ERP and CRM is expected to bring down the procurement costs which should impact the variable cost largely
The Y-o-Y growth in revenue is the single biggest determinant on the profit, ROU and NPV outcomes	Aim for at least 10% growth in revenue to meet the decided hurdle rate. This is considering all other factors remaining constant for the ERP implementation
	Aim for around 14% growth in revenue to meet the decided hurdle rate. This is considering all other factors remain constant for the ERP & CRM implementation
There is a relationship between variable cost, revenue growth and the hurdle rate of return	With a revenue growth of 3.35% and a variable cost of 15%, the target hurdle rate for the company can be met. These should be the target numbers for the company specific to the ERP implementation
	With a revenue growth of 3.8% and a variable cost of 15%, the target hurdle rate for the company can be met. These should be the target numbers for the company specific to the ERP & CRM implementation

Risk Analysis by varying factors such as the current revenue, growth with ERP, growth with ERP & CRM, variable cost and inflation rate

There is a 62% chance that the rate of return for the ERP implementation will fall between 0 and 8.9	This project has long term benefits for the company, so the company should reduce the hurdle rate for this specific project. If not, an investment in the project should not be made
There is a 66.6% chance that the rate of return for the ERP&CRM implementation will fall between 0 and 14.5. However, the chance of the hurdle rate exceeding 10% is minimal	
There is a 61.7% chance of profit with the range varying between $0 and $73,195	Since there is a high chance of profit, this investment should be made for the 20-year period for the ERP Implementation
There is a 67.9% chance of profit with the range varying between $0 and $95,657	
There is a 61.7% chance of a positive ROI for the company over a 20-year period	High chance of ROI is a good sign for the ERP implementation. Make the investment
There is a 68% chance of a positive ROI for the company over a 20-year period	
There is a 61.7% chance of a positive NPV and the values falling between $0 and $72,143	High chance of a positive NPV is a good sign for the ERP implementation. Make the investment
There is a 67.9% chance of a positive NPV and the values falling between $0 and $91,723	

IV. CONCLUSION AND LEARNINGS

As consultants for the project, we were brought in to resolve the contention between the CIO and the CFO by showing the profitability of the company 20 years down the line, if it invested in the ERP systems. We took the available data and performed sensitivity analysis, simulation, and what-if analysis to deduce our results. The project was very insightful since it gave us a glimpse of how real world consultants would resolve an issue. It also made us think how we can factor in different scenarios and their corresponding effects on the profits.

To conclude, we would like to re-iterate our recommendation to the company. Even though the initial investment is very high, the move to the ERP & CRM solution will make the company highly profitable in the years to come. If they do not invest now, there is a high chance the company might go out of business eventually.

V. APPENDIX

1) BACKGROUND:

▪ INDUSTRY:

During the last decade of the twentieth century we saw a major shift across industries regarding the use of technology. Companies started adopting and integrating technology at every step of their business processes to improve how traditional businesses operated. A huge impact of this change was also observed in the Manufacturing Industry in the early 1990s which transformed the way businesses functioned. This was the time when major Fortune 1000 companies had already adopted the enterprise-wide resource planning software and well-organized companies were gaining ground rapidly. 'ERP' and most specifically SAP R/3 became a differentiating factor among companies.

An ERP software is a companywide technology that integrates and collaborates all operations in one central database system. This helps large organizations pool resources to a single common software that helps multiple organizational functions communicate smoothly with each other removing any barrier in between. However, this also meant a huge initial upfront investment on technology along with the potential risk for a failed implementation.

▪ COMPANY:

Mega Corporations were a dominant player in the Manufacturing industry having reach and presence all over the world. They operated out of four major manufacturing locations across the world and had seen major business growth throughout the 1970s and 80s. Most of their expansion happened much before the 'Technology Era' and slowly operational inefficiencies crept in as the Manufacturing and Sales sites operated in silos.

Each of the plant and office locations operated independently with no major integration between each of these sites. This resulted in major redundancy and under-utilization of resources in the company. None of the sites were electronically linked and most of the communication between sites were still happening using outdated mediums. A large amount of time was spent in manually collating and communicating data into the central system in the Headquarters This seriously increased cost and dented the competitive advantage enjoyed by the firm.

▪ SCENARIO:

Mega Corporations were faced with a major dilemma as to whether to overhaul their entire IT system or lose ground to better organized companies in the market place. The discussion escalated to the senior management and they were left with two opposing choices: One which the CIO supported and put forward to implement a ERP system whereas the CFO had an opposing view of any further cost overruns in the face of tough competition and deteriorating market standings.

This was a tough call to make, one which would impact the future of Mega Corporation in the Manufacturing industry for the next two to three decades and beyond.

2) PROBLEM STATEMENT

- **IDEAL SITUATION:**

Mega Corporation must set up an ERP and CRM system to upgrade from the existing systems. The systems today at Mega Corp, do not allow cross communication between teams which leads to considerable loss of information. An implementation of the ERP will lead to data consolidation and will optimize costs and communication throughout the company. This common platform will also help Mega Corporation analyze data from one single repository and use it for cost and effort optimization purposes for the company. Ideally, the new system should generate profits.

- **PROBLEM AT HAND:**

Though the CIO is completely supportive of this new implementation, the CFO is opposed to the idea. The CFO does not believe that the large initial investment and the potential maintenance costs of the software will add considerable value to the overall profit of the company.

- **COST IMPACT OF THE PROBLEM:**

Some managers within this firm are optimistic and would estimate these gains at $7 million per year. Others are pessimistic and would see a loss of $5 million per year due to cost overruns and unexpected retraining expenses. Finally, there is a neutral camp that would prefer to assume no efficiency gains or losses from ERP.

- **SCOPE OF WORK:**

As consultants for this project, we will make a working model on excel. This model will show how the company's overall profit over 20 years will be affected if ERP and CRM are installed, and also, what will happen if the new software is not installed.

We will start off by analyzing all the financials provided to us by the company. With these numbers, we will create a spreadsheet which we will analyze using various optimization techniques, and present to the board of directors, concrete evidence via a presentation, as to why, Mega Corporation, should or should not go ahead with the proposed ERP and CRM installations.

3) CONCERNS

- **ISSUES TO CONSIDER:**

a. The 'Model' should take into account a period of 20 Years for all Cost and Revenue calculations; Huge upfront capital investments.
b. The possible exodus of experienced employees upon the implementation of the new ERP and CRM system.
c. The projected Sales Growth Rates/Year and the trade-off between implementing only an ERP system or both ERP and CRM systems.
d. No prior experience and expertise within the company on the new technologies to be implemented. Possibility of incurring additional costs to hire and maintain a staff of ERP and CRM professionals.
e. New 'Average Inventory' calculation post ERP implementation.
f. The cost to hire and retain new consultants and retraining cost for the entire organization.
g. A definitive 'Hurdle Rate' not defined and agreed upon for the project.
h. The 'Time Value' for money is not taken into account while considering the project.

- **COMPLICATING FACTORS:**

a. Dynamic and ever-changing market conditions; possible entry/exit of a new/old player from the industry.
b. Considerable blind-zone before actual profits kick in.
c. The contract with the ERP and CRM vendor over the period of 20 Years for ongoing support and maintenance activities should be frozen at initiation.
d. Current maintenance costs for legacy systems and parallel costs involved during the transition from legacy to ERP and CRM systems.
e. Efficiency gains from the ERP and CRM systems are not standardized and no clear consolidated revenue steam is predicted.
f. Changing government regulations and international trade statutes.
g. The market trends and inflation rates over the 20 years of scope are not considered which may affect the budget decisions drastically.
h. Possible change in management structure might impact the decision making for the project.

4) PROBLEM FORMULATION:

▪ PARAMETERS:

Parameter Name	Parameter Description
Revenue	The total yearly revenue without ERP or CRM system
Revenue with ERP system	The total yearly revenue with the ERP system
Revenue with ERP and CRM system	The total yearly revenue with the ERP and CRM system
Maintenance Cost	The total cost of maintaining old systems.
Maintenance cost with ERP	The total cost of maintaining old systems with ERP system (as ERP takes 2 years to be operational)
ERP Hardware cost	Cost of ERP hardware in its 2 years of installation
ERP Software cost	Cost of ERP software in its 2 years of installation
CRM Hardware Cost	Cost of CRM hardware in its year of installation
CRM Software Cost	Cost of CRM software in its year of installation
Consultants Working (Days/Year)	Number of working days in a year for consultants
Number of ERP Consultants	Number of ERP consultants needed per year
Number of CRM Consultants Needed	Number of CRM consultants needed per year
Cost of Consultants/Day	Cost of consultants per day
Number of Programmer	Number of programmers added per year
Programmer cost/Year	The cost of programmers per year
Training Cost	The training costs
Inventory Cost Percentage	The percentage of sales revenue to maintain the inventory
Holding Rate	The cost percentage to hold an item in the inventory.
Variable Cost Percentage	Cost percentage of sales excluding the inventory cost

▪ DECISION VARIABLES:

The decision for the firm should be as follows:

- If the firm should continue with the existing IT Infrastructure
- If the firm should go ahead and implement an ERP System replacing the existing IT Infrastructure
- If the firm should go ahead and implement a subsequent CRM system along with the ERP

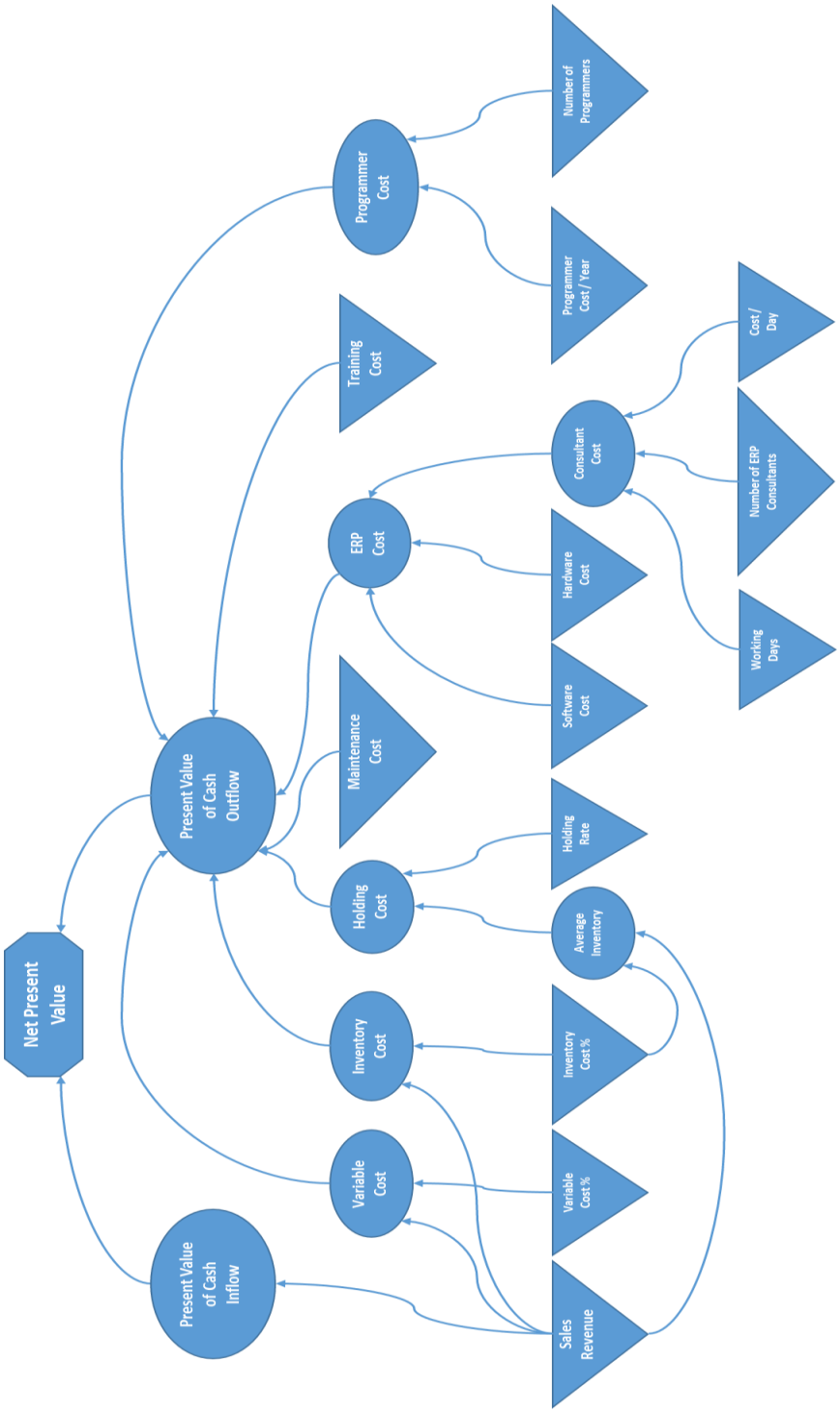
The decision would be based on the Net Present Value and a comparison with the Hurdle Cost involved for the project. The desired Hurdle Cost for the project would be 10%.

▪ OUTPUT MEASURES:

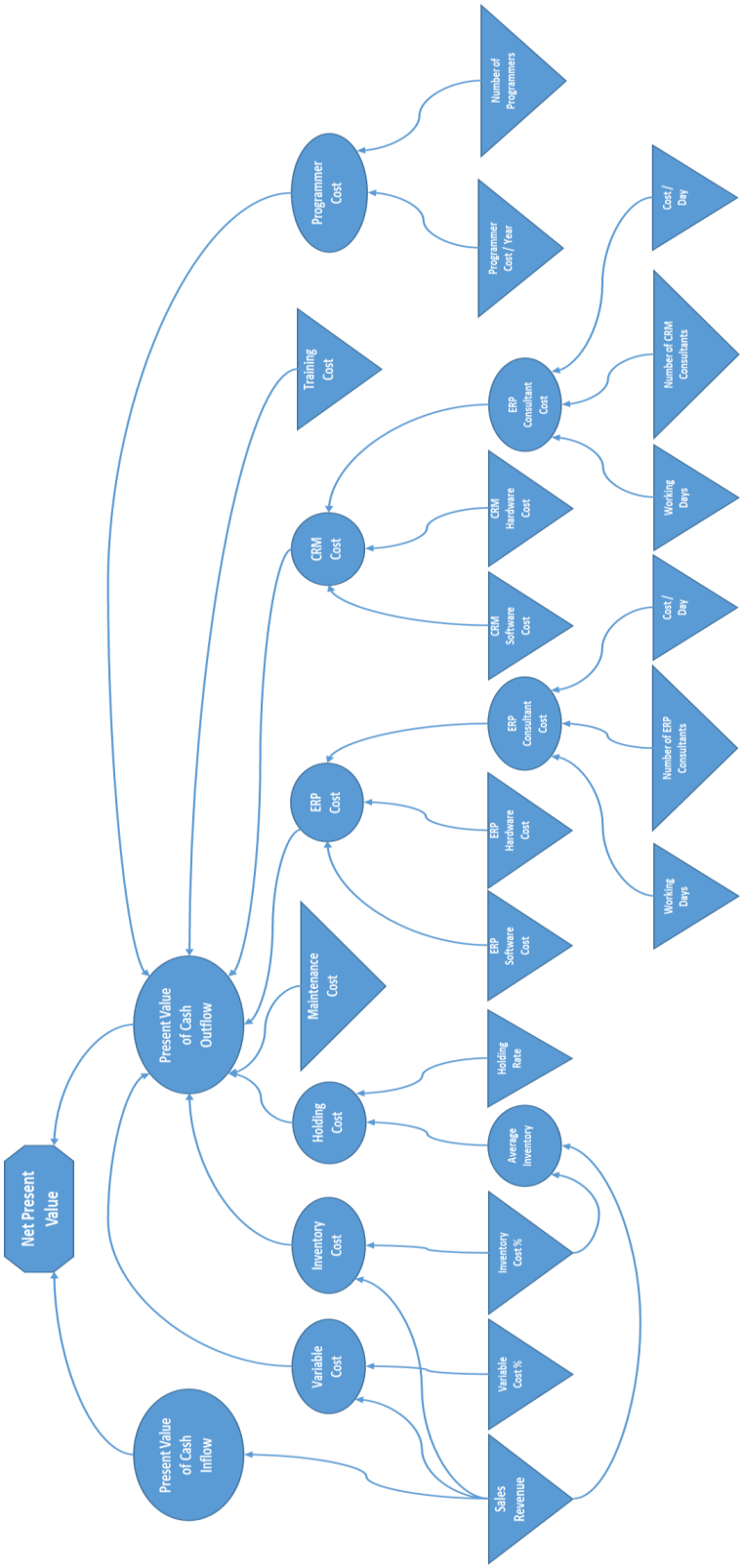
The final objective of the firm would be to determine the Rate of Return of the investment onERP and CRM decisions.

5) INFLUENCE DIAGRAM:

- **WITH ERP SOFTWARE:**



- **WITH ERP AND CRM SOFTWARE:**



6) LOGICAL STRUCTURE:

Variables	Formula
Net Present Value	Present Value of Cash Inflow – Present Value of Cash Outflow
Present Value of Cash Inflow	Sales Revenue
Present Value of Cash Outflow	Variable Cost + Inventory Cost + Holding Cost + Maintenance Cost + ERP Cost + CRM Cost + Training Cost + Programmer Cost
Variable Cost	Sales Revenue* Variable Cost %
Inventory Cost	Sales Revenue * Inventory Cost %
Average Inventory	(Sales Revenue * Inventory Cost %) / 2
Holding Cost	Average Inventory * Holding Rate
ERP Cost	ERP Software Cost + ERP Hardware Cost + ERP Consultant Cost
CRM Cost	CRM Software Cost + CRM Hardware Cost + CRM Consultant Cost
Programmer Cost	Programmer Cost Per Year * No. Of Programmers
ERP Consultant Cost	Consultant Working Days * No. Of ERP Consultants * Cost Per Day of Consultant
CRM Consultant Cost	Consultant Working Days * No. Of CRM Consultants * Cost Per Day of Consultant

II. REFERENCES

Stephen G. Powell, K. R. (2009). *Management Science: The Art of Modeling with Spreadsheets 3rd Edition.* JohnWiley &Sons, Ltd.