**Project Name:** ISMTE

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**Sample Only**

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**1. How the calculation works**

The ISMTE model uses wide set of input parameters to compute intermediate calculation, and then uses the data generated from intermediate calculation to produce a set of outputs. Input parameters are used to calculate the various cost related to Infrastructure, Software, Hardware and salary for employees, quality of the product and revenue generated. Then a summary of all the cost in the model is calculated. Using the summarized cost for all development, revenues generated and quality affected over 12 quarters time span the net revenue are calculated. The Infrastructure Cost, Hardware Cost, Software Cost, Salary related Cost and Active Users serves as the basis for the computation of the net revenue for ISMTE. Details of how the calculations work and some of the important formulas used in the model are discussed below.

**Hiring Stream Calculation**

It calculates the total number of employees per quarter. It also shows total number of hire for quarter and total number of employees left by notation of negative numbers. The Cumulative employees keep track of total number of employees for that quarter. Only hiring stream calculation is one factor in the complete model which uses different logic to get the employee count.

In scenario 1, in house development, we are calculating total number of employees joining per quarter using the “if” formula applied to the complete hiring stream matrix. For FT employee the formula used to calculate the number of employees joined during the course of the project can be calculated using:

“(HiringStreamFT\*IF(HiringStreamFT>0,1,0))”.

The new hiring matrix then gives only employees who joined the project. All the negative values (people who left the project) will be calculated in the same way using:

“(HiringStreamFT\*IF(HiringStreamFT>0,0,-1))”

The same logic is applied for Part time employees, Interns and consultants.

Once the matrix is determined we then use the sum formula to calculate the number of people joining and leaving in that quarter. The negative sign indicates people have left the project.

Once we determined the total number of people joined the project and number of people left the project we then use the if formula to determine the employee count:

“IF(NoOfPeopleJoining+No.ofPeopleLeaving>0,NoOfPeopleJoining,0)”

The employee count is calculated to keep track if more people left the project and then few people were hired there equipment (like PC, software, parking etc) can be used by the new employees.

In Scenario 2, since most of the employees involved in the project will be consultant, it is assumed that they will be having there own PC, software and there own infrastructure (in India) where they will be making the software. So in this case, employee count which is referred as “TotalNoOfEmployeesWithoutConsultants” employee without consultants has to be calculated. This employee count will be used to calculate the hardware cost, software cost and infrastructure cost. First using the hiring stream, calculated the total number of employees in each quarter. The SUM formula is used to calculate the employee count in each quarter.

In order to calculate the total number of consultants hired in each quarter following formula was used:

“SUM(INDEX(HiringStreamConsultants,0,Up))”

Where “Up” in this case is the period number (or the column number). Once we determine the total number of consultants, we then used the difference of total employees and total number of consultants to get the total number of employees without consultants:

“TotalNoOfEmployees-TotalNoofConsultants”

**Cost Calculations**

This is the combination of all the costs associated with development of the product. Relevant calculations are discussed below.

**Infrastructure Cost**

In order to calculate the infrastructure cost we first use matrix multiplication using the furniture analysis and the hiring stream for Full time, Part time, Interns and Consultants to get the total count of furniture that will be needed by each employee. We then use another matrix multiplication with result that we got with the furniture cost to determine the amount we will be spending in each quarter for furniture. Following is the formula that was used to calculate the cost of furniture for FT:

“MMULT(TRANSPOSE(FurnitureCost),MMULT(TRANSPOSE(FurnitureAnalysisFT),HiringStreamFT))”

Same formula was used to calculate the furniture cost for Part time employees, Interns and consultants. After determining the total furniture cost we noticed that people who left the project have negative value in the matrix which means once the employee left the company got the complete (100%) money back for that furniture which might not happen in the real world. So in order to avoid this we assumed that once the employee left the project the employee furniture won’t be used by anyone and the company will donate that furniture. So for employees who left the project company won’t be getting any money. So in order to determine that we used the “if” statement to check if there is any negative value:

“IF(FurnitureCostFT<0,0,FurnitureCostFT)”

Same logic was used for other employees too.

We then use the sum formula to calculate the total furniture cost in each quarter:

“FurnitureCostFTAnalysis+FurnitureCostPTAnalysis+FurnitureCostInternsAnalysis+FurnitureCostConsultantsAnalysis”

**Salary Cost**

Since the full time employee salary defined in the input parameter is per month we multiply that amount with three to get the quarterly salary. Formula used to calculate this:

“SalaryFT\*Quarterly”

In order to calculate the salary for full time employee we used the amount paid to employee every quarter with the full time hiring stream defined as input stream. Matrix multiplication was used to calculate the salary for full time employee:

“MMULT(TRANSPOSE(SalaryFTQuarterly),HiringStreamFT)”

In order to determine the salary for part time employees, interns and consultants (as they are paid hourly), we first calculated the number of hours the employee worked in each quarter using the formula:

“HiringStreamPT\*NoOfHoursPerMonth\*Quarterly”

We then used the matrix multiplication using the number of hours calculated before with the hourly rate to determine the salary paid to each employee.

“MMULT(TRANSPOSE(SalaryPT),PTHoursQuarterly)”

The negative salary indicates that employees left on that quarter and the company did not paid that amount on that quarter. The total salary company is spending each quarter is reflected in the cumulative total salary.

We then used the sum formula to calculate the cumulative total salary.

**Hardware Cost**

This calculation involves LCA for each server and each PC.

For PC calculation we first calculated the PC payment per quarter using the PMT formula:

“PMT(PCInterestRate/4,PCPeriods,-1000)”

For the total number of employee we are using the employee count instead of the total number of employees as we are assuming that we do not have to lease any new equipment for new employee if we have the equipment that was used by the previous employee who no longer works on the project. For scenario 2, we will be using total number of employees who is not consultant as we are assuming that the consultants will be having there own PC.

We then calculate the PC depreciation rate per quarter using:

“IF(COLUMN()>COLUMN(PCDepreciationPQ)+PCDepreciationTerm-1,0,1)/PCDepreciationTerm”

Using the employee count and the PC cost, we determine the total cost of the PC for every quarter.

“EmployeeCount\*PCCost”

Before calculating for the original cost of the PC, we first calculate the LCA for a $1000 PC. We can then use that matrix to CONVOLVE with the PC cost per quarter.

We start with the Principal payment calculation using

“PPMT(PCInterestRate/4,PeriodNumber,PCPeriods,-1000)”

We then calculated the cumulative principal payment for each quarter.

We then calculated the PCPayment, Assets, Liabilities, PC Depreciation and Interest rate. For interest rate we used the following formula:

“IPMT(PCInterestRate/4,PeriodNumber,PCPeriods,-1000)”

Using the CONVOLVE for PC, we got the PC payment that was done on every quarter.

“CONVOLVE(LCAPC,PCCostPQ)/1000”

Same LCA calculation was done for all the servers that will be used in the project. The only difference is the server cost will be fixed and we won’t be buying any new server. Following CONVOLVE formula was used:

“CONVOLVE (LCAServer,INDEX(ServerCost,1,0))/1000”

“CONVOLVE (LCAServer,INDEX(ServerCost,2,0))/1000”

“CONVOLVE (LCAServer,INDEX(ServerCost,3,0))/1000”

**Software Cost**

The software can only be purchased for atleast the minimum user requirement. For example, for a Mail server when software is sold the minimum user requirement is 20. We used the following formula to calculate the software cost:

“CEILING(CumEmployeeCount/MinUserReq,1)\*SoftwareSupportCost”

We then used the sum formula to determine the total software cost spend in each quarter.

We are using the employee count instead of the total number of employees as we are assuming that we do not have to buy a new license for new employee if we can use the license that was used by the previous employee who no longer works on the project. For scenario 2, we will be using total number of employees who are not consultant as the consultant will be having there own software.

Expense

We calculated all cost related to Infrastructure Cost in addition to Furniture cost calculation mentioned above, and other cost such as Utilities, Rent, Phone, Books and Misc which are constant per quarter. Parking cost is based on assumption that 70% of the employees will be using parking facilities, this intermediate cost calculation is total current number of employee’s times the percentage of the employees who use the facility times the parking cost.

Below is the formula that is used to for parking cost:

“CEILING(CumEmployeeCount\*DrivingEmployee,1)\*ParkingCost”

Other Cost related to Salary, Hardware and Software cost is calculated in relative worksheet as mentioned above, but presented in Expense worksheet with total cost respectively. Total running sum of all cost per quarter is the total expense occurred per quarter.

**Revenue Calculation**

**Quality**

In order to calculate the growth in customer we used the difference of new customer with the existing customer who stopped using the software.

**Active Users/Trading**

In order to calculate the customer count we will be using the growth in customer calculated before with the initial users. The customer count is always based on the initial users not the total number of users before that quarter. Formula that will calculate the customer count:

“CurrentCustomers\*InitialUsers”

We then calculate the cumulative number of users each quarter. Since we have an initial count of 1500 it will start from that plus the number of users joining each quarter.

We then used the Number of people trade daily input stream to calculate the number of times people trade daily. It uses the customer count and does a matrix multiplication with the number of trading happening daily and then uses the SUM to calculate the number of trades (daily).

“SUM(MMULT(INDEX(CumCustomerCount,0,Up),NoofPeopleTradingDaily))”

It then uses that number of trading happening daily multiplies with the number of trading days in a quarter to determine the number of trading done in that quarter:

“NoofCustomertradingdaily\*NoOfTradingDays”

Once we have know the number that happened in that quarter we multiply that with the trading cost to get the revenue that was generated.

“NoofCustomertradingquarterly\*TradingCost”

**Output**

All of the costs (infrastructure cost, salary, hardware cost & software cost) are calculated in the previous worksheet and are presented in this worksheet. We then use the running some to calculate the Total Cost.

For Revenue all the revenue calculation is done in the revenue worksheet, we then uses the revenue formula

“NoofCustomertradingquarterly\*TradingCost” to determine the Total Revenue.

Output represents the net revenue per quarter by taking the difference of total expense per quarter and total revenue generated per quarter.

**2. How to locate inputs, outputs and intermediate results**

The model has a worksheet for input data, seven worksheets for intermediate data, and one worksheet for output data. The input data is located in the parameters worksheet; intermediate results data are located on the following worksheets: Hiring Stream, Infrastructure Cost, Software Cost, Hardware Cost, Salary, Expense, Revenue and the Output data including total cost Vs revenue generated chart is located in the Outputs worksheet.

In addition, some charts can also be found in the Expense worksheet and Revenue worksheet.

In the Expense worksheet the Expense chart.

It shows how all various costs per quarter.

All data source are calculated in relative worksheet, but they are presented in Expense sheet.

1. Infrastructure Cost: It shows the various cost including Furniture, Rent, Utilities, Parking, Phones, Books and Misc over the modeled time period. It has data sources include ISMTE-scenario1.xls'!TotalInfrastructureCost, which is presented in Expense sheet.
2. Salary: It shows salary for the various employee including FT employees, PT employees, Interns and Consultants over the modeled time period. It has data sources include ISMTE-scenario1.xls'!TotalSalaryCost.
3. Hardware Cost: It shows Hardware related cost for the various servers and PCs over the modeled time period. It has data sources include ISMTE-scenario1.xls'!TotalHardwareCost.
4. Software Cost: It shows software related licensing cost for the various software required to support the development over the modeled time period. It has data sources ‘ISMTE-scenario1.xls'!TotalSoftwareCost.

In the Revenue worksheet the following relevant charts:

1. Quality: It shows the current number of customers (users) who does use the product for online trading. It’s data source is 'ISMTE-scenario1.xls'!CurrentCustomers.
2. Revenue Generated: This graph shows that based on statics of how many customers does trading on what time of the day, it shows how much revenue is generated per quarter for trading Cost input parameter. It has data source as 'ISMTE-scenario1.xls'!RevenueGeneratedEachQuarte.

In the Output worksheet the graph is for Net Revenue and Cost Revenue Analysis.

1. Net Revenue:It shows how the net revenue varies over time span of project development. It has data source ISMTE-scenario1.xls'!NetRevenue. It is the difference of TotalRevenue andTotalCost.
2. Cost Revenue Analysis:It displays the total cost and total revenue generated over the time span of 12 quarters. Total revenue generated is from data source'ISMTE-scenario1.xls'!TotalRevenue. Total cost is from the data source 'ISMTE-scenario1.xls'!TotalCost.

**3. Guide to visual cues and naming conventions**

All the parameter or the calculation in the both the scenario are color coded. Below are the details of the color’s that are used in each scenario:

|  |  |
| --- | --- |
| **Parameter** | **Definition** |
| Green | All the inputs that can be updated are defined in green color. |
| Purple | Input Parameter or input stream that can be change for multiple scenario. |
| Brown | Used to reference to the input value |
| Light Blue | Used to denote a calculation field. |
| Yellow | Used to denote the final calculation for that sheet |
| Grey | All the headings used in both the scenario are defined in grey color. |

**4. How to make changes**

The model could be extended through the inclusion of additional costs such as marketing process related cost for ISMTE product as input parameter stream. For the addition of various costs, new worksheets would simply be created to accommodate the new cost. Each new worksheet should follow the same format as the existing cost worksheets such as Infrastructure cost or Salary Cost. Each new worksheet should be named XCost where X is for the representing cost for. After the worksheets are added, the parameter sheet will need to be modified to include the marketing cost per quarter for projection for the newly added cost for time span of 12 quarters.

Specifically, it’s needed to add the named range for marketing cost for each quarter to include the new cost. Also, the Expense worksheet will need to be modified to include the newly added cost. To add additional cost elements, simply add them to the Parameter sheet. The intermediary data for the additional cost worksheet representing the newly added costs and then it will need to be added to the total cost section of the Expense worksheet.

By changing the changeable parameters/stream such as Consultant Rate, Quality of the Product (in terms of the number of current customers) and Trading Cost, we can learn how the model reacts to the net revenue. Higher consultant rate contributes to higher salary cost and hence lowers the net revenue. Higher the quality of the product, high customer growth generates the higher revenue. The higher trading cost reflects higher revenue generated per online trading transaction. By changing the changeable parameters, higher management can use the model to predict the financial performance for other out-sourced consultancy firm located in China where the development cost might be less expensive than that of India.