NANYANG POLYTECHNIC

Course : Diploma in AI and Data Engineering

CmU : EGT213 – Operations Management

Operations Management Project

Project Description

The learning objective of this project is to let students deliver the optimal solution to allocate resources by applying an optimisation tool to complex problems.

Students are encouraged to observe real life experiences and select a real-world problem that they are interested to solve in various application sectors, such as public service (government departments/agencies), health care (clinics, hospitals…), transportation (land, air, harbour…), business service (bank, department store, food, entertainment…), manufacturing industries (automobiles, electronic…) and so on. The focus of the project is on the practical aspects of setting up problem model(s), applying sensitivity analysis and analysing the solution(s).

Please note that this is an individual project.

Project Requirements

1) **Project Selection and Define the problem**

   For students to select **ONE** real-world situation and identify **ONE** problem that they want to solve by the optimisation tool. Students are required to use Excel Solver as the optimisation tool to determine the optimal solution(s) for their problem(s).

   For example, Excel Solver can assist with problems like minimizing the total cost of shipping products from several factories to different customers, finding the optimal production schedule for a manufacturing plant, or maximizing profits for a business.

   Report should include:

   - project Title
   - description of selected real-world situation and problem(s) to be resolved by the optimisation tool

2) Setup the model in Excel

To set up the spreadsheet model in Excel with 3 main sections.

1) Data section to enter the supply, demand and cost or benefit data
2) A decision variable section that represents the values that the optimisation tool can modify which correspond to the problem stated
3) Objective Function on the value that you are optimising

You can create other sections (if necessary) that support your model setup.

Report should include:

- data assumptions for the model and how you generate the random numbers for the assumptions.
- description of the decision variables
- description of the objective function
- description of the constraints on the decision variables of the problem to control the range of each variable

3) Using Excel Solver

Activate the Excel Solver where you can specify the settings and parameters for your problem. Run excel solver to find the optimal solution based on the settings and parameters specified.

Note that you need to save your problem model in the excel spreadsheet to be able to reload your solver parameters for your model.

Report should include:

- Screenshot(s) of the Excel Solver with all the settings and parameters used to solve the problem
- Screenshot(s) of the excel spreadsheet with the optimal solution.

4) Sensitivity Analysis - What-If Scenario(s)

Create **at least ONE** What-If scenario to determine the impact of changes that might affect your decision variables and objective function value.

Report should include:

- Description of the What-If scenario(s)
- Screenshot(s) of the Excel Solver with all the settings and parameters used to solve the problem
- Screenshot(s) of the excel spreadsheet with the optimal solution.

5) Project Result Analysis and Conclusions

In the report, interpret and analyse the solution that the Excel Solver found. Compare the optimal solution with the What-If scenario(s) that affects the decision variables and objective function value. Use appropriate chart(s)/diagram(s) to present your analysis if necessary.

6) Project Documentation (Report) and Excel Spreadsheet Submission

Document the project in a formal report in word document and create the model in the excel spreadsheet. Submit both word document and excel spreadsheet in Brightspace by Week 19.

Project Rubrics

Marks will be allocated based on the completeness and thoroughness of the report and excel model.

Developing (0-9)	Functional (10-15)	Proficient (16-20)
Basic problem defined to be solved by the optimisation tool. Poor description of the problem that represents the real-world situation.	Good problem defined to be solved by the optimisation tool. Fair description of the problem that represents the real-world situation.	High complexity of the problem defined to be solved by the optimisation tool. Detailed description of the problem that represents the real-world situation.
Setup of the model in Excel with errors. Poor description of all settings and parameters used in the model.	Fair setup of the model in Excel. Fair description of all settings and parameters used in the model.	Good setup of the model in Excel. Detailed description of all settings and parameters used in the model.
Error in running excel solver to find the optimal solution based on the settings and parameters specified. Did not save the problem model in excel spreadsheet.	No error in running excel solver to find the optimal solution based on the settings and parameters specified. Did not save the problem model in excel spreadsheet.	No error in running excel solver to find the optimal solution based on the settings and parameters specified. Save the problem model in excel spreadsheet.
Create 1 What-If Scenario.	Create 2 What-If Scenarios.	Create 2 or more What-If Scenarios.

Poor description of the What-If scenario(s) with no Screenshot(s) of the Excel Solver with all the settings and parameters and no Screenshot(s) of the excel spreadsheet with the optimal solution.	Fair description of the What-If scenario(s) with Screenshot(s) of the Excel Solver with all the settings and parameters and Screenshot(s) of the excel spreadsheet with the optimal solution.	Detailed description of the What-If scenario(s) with Screenshot(s) of the Excel Solver with all the settings and parameters and Screenshot(s) of the excel spreadsheet with the optimal solution.
Basic interpretation and analysis of the solution that the Excel Solver found, with comparison of the optimal solution with the What-If scenario(s)	Fair interpretation and analysis of the solution that the Excel Solver found, with comparison of the optimal solution with the What-If scenario(s)	Detailed interpretation and analysis of the solution that the Excel Solver found, with comparison of the optimal solution with the What-If scenario(s)