**MBA648: Business Process Analytics**

**Assignments 2**

**(Given: March 18, 2024, Due Date: April 2, 2024, at 23.55 hrs on Dropbox)**

**SUBMISSION GUIDELINES**

**General Guidelines:**

* Every group should have a team coordinator, who is responsible for submitting the formatted copy of the files in the dropbox (on course website).
* Every submission should be composed of exactly two files: (1) word file (.doc) or a .pdf file describing the procedures/solutions and (2) an excel file with all the calculations and details.
* Also highlighting the final answers (wherever applicable).
* State your assumptions very clearly.
* Show sample calculations wherever necessary.
* No email submissions are acceptable.

**Formatting Guidelines:**

* Include a cover page that includes the names and student IDs of the members of the group.
* Use 8 1/2" x 11" (22x 28 cm) paper with margins of at least 3/4" (2 cm) all around.
* Use 12-point font in professional fonts such as Times New Roman, Constantia, Arial, etc.
* Text must be single-spaced with a maximum of six lines per inch.
* If you have tables/figures in the .doc file, make sure that the tables/figures are formatted to fit the document (with **legible font size**). Format the size of the tables/figures so that you leave a margin of at least 3/4" (2 cm) all around.

**Q 1:** A consumer electronics store that sells a flash drive knows that the annual demand for this drive is fairly constant at 5000 units/year at the selling price of $30/unit. The manufacturer of this drive charges a delivery fee of $200 for each order, regardless of the number delivered. In addition, in-house costs associated with each order (e.g., unloading, order processing) total $50. The inventory holding costs have been estimated at 20 cents/dollar/year.

Currently, the manufacturer charges $20/unit for 0-1000 units ordered but is willing to give a discount of 3% per unit for all units on order sizes between 1001-2000 units and 5% per unit for all units on order sizes of 2001 units or more.

1. What order size will maximize the profit for the store from sales of this flash drive? Determine the profit at that order size?
2. Determine the effect of varying the inventory holding cost (currently at 20 cents/dollar/year) on the profit-maximizing order quantity and the total cost. Plot order quantity vs. total cost for various values of inventory holding cost.

The new management at the manufacturer is willing to offer a different price menu. As per this price menu, the manufacturer will charge $20/unit for 0-800 units ordered but is willing to give a discount of 3% per unit for all units on order sizes between 801-1800 units and 5% per unit for all units on order sizes of 1801 units or more.

1. What order size will maximize the profit for the store from sales of this flash drive? Determine the profit at that order size?
2. Determine the effect of varying the inventory holding cost (currently at 20 cents/dollar/year) on the profit-maximizing order quantity and the total cost. Plot order quantity vs. total cost for various values of inventory holding cost.

**Reference: Quality Control at Polaroid**

**Q 2:** Analyze the impact of baseline data (Exhibit 3) on the quality control decisions for the finger height of the injection molded plastic end cap. Using the baseline data in exhibit 3, sample data in exhibit 6, and appropriate SPC charts, analyse the finger height of the injection molded plastic end cap and comment if the process in control. What conclusions should Rolfs draw? (Compute the control limits, construct the charts, and summarize your observations). *Note: There are eight control charts – 4 X-bar charts and 4 Range charts in this case. For example, one with Shift A data only, Shift B data only, Shift C data only, and the other with Shift A-B-C data only.*

**Q 3:** The Société de transport de Montréal (STM) is a public transport agency that operates transit bus and rapid transit services in the urban agglomeration of Montreal. The agency would like to setup a comprehensive quality assurance/control program. Develop a comprehensive quality assurance/control program for an Société de transport de Montréal.

Describe the business process or processes within the organization that you would like to analyze. Identify different check points in the organization where you will monitor the quality. Cleary state what you will measure. Indicate the type of control chart(s) that you will recommend. How will you select your sample size? How will you set the upper and lower control limits? What are the implications of setting tighter/loose control limits? Comment on the costs and benefits associated with each of these quality check points. (**Note: No calculations are expected**). (*Limit your answers to 1500 words*).