

Project

Production and Inventory Control

ISEN 615

Assigned: July 7, 2020

Due: August 3, 2020

Project Requirements. The purpose of the project is for you to select which modeling approaches and methods to utilize to provide key insights into production planning decisions that will be made for a potential company. A product of your project will be a report summarizing your models, methods, and results. Therefore, you should describe any mathematical models of the problem that were developed in the analysis, listing any decision variables and constraints. Further, please discuss the procedures (for example, the type of analysis applied, data manipulation) to generate your findings or support your conclusions. There is a natural ‘organization’ to the structure of your report which coincides with the topics of interest to the company; however, keep in mind that you must adequately organize your project report so that it is understandable and provides enough details for the instructor to understand your solutions.

You may work in groups of up to 4 students on the project. Your group will turn in a single electronic copy of your project report (including appendices providing electronic files) e-mailed to the instructor (at geunes@tamu.edu). You are only allowed to discuss the project with the instructor and the members of your group. Do not collaborate with other members of the class outside of your group. You must provide me your group members by **July 15, 2020**.

Project Description. MCS Corporation produces an amazing toy called DinoBall. This toy is so popular that MCS Corporation can run 8 retail stores dedicated to selling just this product. MCS Corporation is dedicated to meeting all demand for Dinoball. The toy is produced at 3 production facilities owned by MCS Corporation, each of which has multiple production lines dedicated to producing the DinoBall toy. The characteristics of each of these production lines are a function of their age: newer production lines produce the DinoBall toy quicker and use less power.

MCS Corporation plans monthly for production levels across its facilities based on the demand for DinoBall. Currently, DinoBall operates under the policy that each facility will, monthly, produce the same number of toys. In other words, the facilities are ‘balanced’ in that each of them produces $\frac{1}{3}$ of DinoBall’s monthly demand. MCS Corporation likes the idea of equal ‘wear and tear’ on each production line at a particular facility: MCS Corporation currently implements the requirement that every production line at a facility runs for the same length of time during a month. For purposes of this analysis, you can assume that a ‘month’ consists of four 40 hour weeks (for a total of 160 hours). Each production line has the required salaried staff to operate the production lines who all work 40 hours per week. MCS Corporation contracts with LM Trucking to transport DinoBall from their facilities to their retail stores. LM Trucking needs your team to solve an optimization problem to determine the shipment levels and associated costs. The policy of LM Trucking is then to charge a premium of 20% to MCS corporation in billing them for the logistics services. MCS is charged for the energy they use to run their production lines. Due to their age, each production line requires different amounts of energy (kWh) and each production facility has negotiated a set price per kWh with the power company.

MCS Corporation hired your group to address several areas of interest that they believe can be addressed using Industrial and Systems Engineering models and methods. They provided you with past data (e.g., historical demand levels, distances between facilities and retail stores, characteristics of production lines) about their company to help address these areas of interest. The past data is available in the associated Excel file. The MCS Corporation is interested in addressing two ‘what-if’ questions independent of each other.

1. MCS Corporation is considering removing the policy that each facility is responsible for producing the same number of toys. They believe that this would drive down their total operating costs but are concerned about the idea of restructuring their company (i.e., they may need to relocate workers amongst their facilities, increase worker hours). MCS Corporation is interested in determining the amount of savings that would result from removing this policy. Note that the “even wear and tear” policy on the production lines will remain in place.
2. MCS Corporation has an opportunity to update all production lines with the new technology ‘FastProd’. This new production line will decrease production costs of DinoBall since FastProd produces at a faster rate with less energy. They believe that the life cycle of each new production line will be 3 years. The company that sells FastProd insists that they will only install FastProd at the facilities of MCS Corporation if all production lines are outfitted with FastProd. MCS plans to sell each existing production line that is replaced; however, MCS is unsure how much they will be able to sell the used lines for. MCS Corporation would like to determine a ‘reserve price,’ which is the maximum amount they are willing to pay for this type of contract, in preparing to negotiate with the company that produces FastProd.

Sketch Outline of Project Report. This is only a *suggestion* for the project report. You need to write your project report in the best way to describe your model, analysis, and results.

- I. Introduction - Explain the project, a summary of your approach, and outline of the report.
- II. Model - Explain core mathematical model including decision variables, objective function, constraints, and parameters. Please only use summation notation.
- III. Data - Explain what data you are using - do you assume future demand = historical demand? What about costs? Are they per-unit or per-truck?
- IV. Results - Have subsections addressing each of the ‘what-if’ questions. Explain adjustments you make to the model/data within each subsection. Also, come to a conclusion to answer each question.
- V. Conclusions - Summarize your process and results. Outline any future recommendations and studies that should be conducted.
- VI. References - Cite any references you use to aid in your work (e.g., course book, data analysis techniques, supplementary information).