

Memo 7 – Plant Manager

Subject: Quantifying Project Risk – Monte Carlo Simulations
From: Ethan Beets, Plant Manager

Back in 2021, we experimented with using Monte Carlo simulations to better understand and quantify the financial risks tied to our paint booth project. At the time, we ran the model in **Google Colab** using my estimates for optimistic, pessimistic, and most likely cost outcomes. The gave us a much clearer picture of the potential range of costs, rather than relying on single-point estimates.

Monte Carlo simulations remain one of the most effective ways to forecast project risk. By running thousands of randomized scenarios based on defined probability distributions, we can see not only the average expected outcome but also the likelihood of high-cost events that could impact our budget. This approach is far more practical than static estimates, since it reflects the uncertainty we actually face in the field.

To move forward in 2024, I've updated our risk distribution data. You'll find both the summary below and a CSV file in the resources section that you'll need to download.

2024 Risk Distributions				
Risk	Min	Most Likely	Max	Likelihood
Permits	\$150	\$575	\$1,000	0.5
Facility Prep	\$2,000	\$7,000	\$12,000	0.2
Equipment Rentals	\$250	\$1,125	\$2,000	0.5
Installation	\$1,000	\$4,000	\$7,000	0.8

Your objective is as follows:

1. Download the new 2024 risk distribution CSV from the resources section.
2. Upload it into your Google Drive.
3. Open the provided Google Colab template.
4. Replace the 2021 data in the template with the 2024 data you've just downloaded.
5. Run the simulation and generate an updated graph showing the risk-adjusted cost distribution.

This will give us a realistic view of potential cost exposure for the upcoming project and help leadership decide on a prudent budget contingency.

Tip: If you get stuck, try using Gemini in Google Colab to help you adjust the code. When we first ran these simulations back in 2021, AI tools like that didn't even exist!

Best,
Ethan