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This is a graded discussion: **6 points possible**

due Apr 10 at 4:29pm

34   82

Explaining Risk Management [Discussion 2.1]

✔ 📄 (https://classroom.emeritus.org/courses/9054/modules/items/1506909)

✔ 📄 (https://classroom.emeritus.org/courses/9054/modules/items/1506911)

✔ 📝 (https://classroom.emeritus.org/courses/9054/modules/items/1506912)

✔ 📄 (https://classroom.emeritus.org/courses/9054/modules/items/1506914)

✔ 📝 (https://classroom.emeritus.org/courses/9054/modules/items/1506916)

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⊖ 🚀 (https://classroom.emeritus.org/courses/9054/modules/items/1506922)

◯ 📄 (https://classroom.emeritus.org/courses/9054/modules/items/1506924)

◯ 📄 (https://classroom.emeritus.org/courses/9054/modules/items/1506925)

✔ 📄 (https://classroom.emeritus.org/courses/9054/modules/items/1506926)

There is one discussion on this page. Please scroll down to complete it.

Discussion 2.1: Explaining Risk Management [25–30 Minutes]

🎯 Learning Outcome Addressed:

- Explain the advantage of risk pooling/flexibility to mitigate the impact of uncertainty.

Live Support :ussion and will count toward course completion.*

Assume you are a lead data scientist for a corporation that owns 12 stores and is preparing for a busy weekend of sales. Your stores have shared inventory, which can be moved between stores. The stores have a combined total of 9,500 units in inventory; however, you have predicted this is not enough inventory to satisfy all your customers during the weekend.

Based on your findings in Try-It Activities 2.3 and 2.4, write a memo to management explaining how much inventory you will need to order and what fill rate that will guarantee, along with how you came to these decisions. Then, respectfully respond to your peers with any concerns or encouragement you have toward their memo.

Be sure to read the statements posted by your peers. Engage with them by responding with thoughtful comments and questions to deepen the discussion.

Suggested Time: 25-30 minutes

Rubric: Discussion 2.1

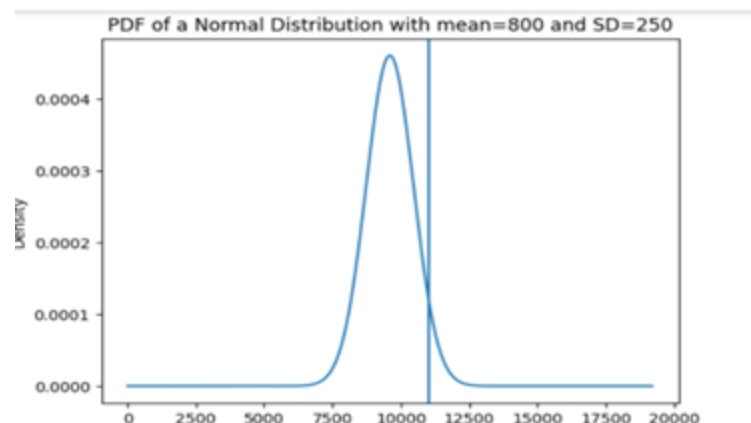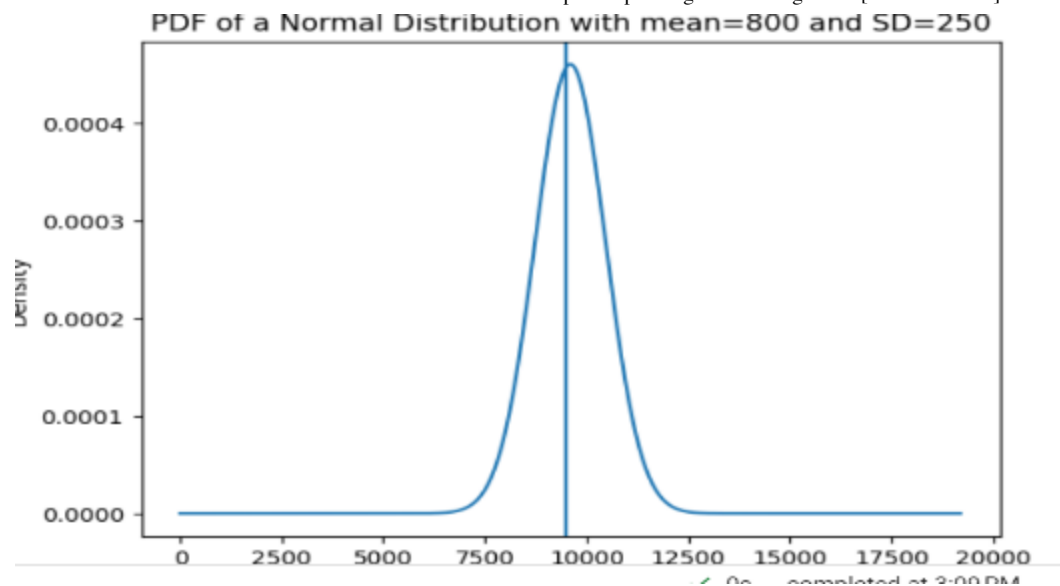| Criteria	Exceeds expectations	Meets expectations	Below expectations
Thoughtful and complete response to the question(s)	**4 pts** Fully responds to the question(s), post is supported by connections to the reading and real-life examples, and post makes additional connections to the field of data engineering with novel ideas, critical thinking, or extensive application of how to use the topic in future work.	**3 pts** Fully responds to the question(s), and post is supported by connections to the content or real-life examples.	**0 pts** Partially responds to the question(s), or connections to the content are missing or vague.
Engagement with the learning community	**2 pts** Posts thoughtful questions or novel ideas to multiple peers that generate new ideas and group discussion.	**1.5 pts** Asks questions or posts thoughtful responses to generate a single peer's response.	**0 pts** No responses to peers or posts minimal or vague responses to peers that do not motivate a response (e.g., "I agree.").

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↩ **Reply**

Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)

(https:/

Apr 4, 2024

To: All fellow learners

From: Manjari Vellanki

Date: 4/4/2024

Subject: Demand planning and Inventory Management for weekend sales.

Overview: Demand planning for upcoming weekend sales by considering over past few years data to facilitate the Inventory Management across consolidated stores and to identify the ideal number of units that requires to satisfy all our customers during the weekend.

In preparation of busy weekend sales across 12 stores that has shared inventory and considering previous statistics during this period, the combined inventory of 9,500 units is not enough as it could accommodate approximate fill rate of 46% customers and a stock of 11,024 units would have a fill rate of 95% of customer needs.

PDF of a Normal Distribution with mean=800 and SD=250

PDF of a Normal Distribution with mean=800 and SD=250

Individual store unit vs consolidated store units:

There is a requirement an average of 1000 units as per customer demand for each store and which turns out to be 12,000 units (1000 *12) together.

Whereas, by centralizing stocking locations may allow us to reduce lead time demand uncertainty (risk pooling) especially when lead time demands between stocking locations are negatively correlated. The average requirement of units for 12 stores consolidated would be 11,024 to fill 95% of customer demand.

Advantages of Risk pooling: Reduction in safety stock requirements ,Reduction in costs and inventory sharing between stores to balance demand uncertaininity between stores in different locations.

Conclusion: There is a requirement of combined inventory of minimum of around 11,024 units and a maximum of 12,000 units during the weekend sales to fill in customers demand.

Edited by **Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)** on Apr 6 at 11:38am

↩ **Reply** 👍 (2 likes)

(http   **Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)**
Apr 6, 2024

Very clear answers and layout. My only question would be if from a risk management point of view using a 95% fill rate and a 5% probability of not being able to fill in that demand isn't too high? And if you shouldn't be using a 99% fill rate here which I tried to use to minimize the risk of not being able to fullfill the demand that weekend? Just a thought and curious on your views

Thanks, Javier

↩ **Reply** 👍

(http   **Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)**
Apr 7, 2024

Hi Javier-

Thanks for your reaponse. Agree, that's the reason why I mention 11,024 units which has 95% fill rate as minimum quantity in my conclusion. I understand from Module2 ,predective analysis is always involved with risk and there is possibility of might or might not facing the situation and solution is always stays in between the range values. Correct me if I'm wrong.

↩ **Reply** 👍

(http   **Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)**
Apr 7, 2024

Hi Manjari, so nice to meet you. Great post, providing a 95% fill rate recommendation and guaranteed supply of 1,000 while explaining the benefits of risk pooling or having a shared combined supply of inventory units allows for well-rounded and informed decision making.

Demand planning and inventory management are fascinating – thank you for sharing.

↩ **Reply**   👍

○

(http   **Manjari Vellanki** **(https://classroom.emeritus.org/courses/9054/users/231480)**
Apr 7, 2024   ⋮

Hi Mariana-

Thanks for your response and nice to meet you too :)

↩ **Reply**   👍

○

(http   **Ricardo Anaya** **(https://classroom.emeritus.org/courses/9054/users/228915)**
Apr 8, 2024   ⋮

loved the graph

↩ **Reply**   👍

○

(http   **Roy Nunez** **(https://classroom.emeritus.org/courses/9054/users/229552)**
Apr 8, 2024   ⋮

Manjari,

I like the fact that you integrated the rick pooling concept from the lecture into your email.
The CDF inverse line is also a nice touch on your graphs. Maybe it would have been good
to label or reference. Great email overall.

↩ **Reply**   👍

○

(http   **Manjari Vellanki** **(https://classroom.emeritus.org/courses/9054/users/231480)**
Apr 10, 2024   ⋮

Thanks Roy

↩ **Reply**   👍

○

(http   **Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)**

       Apr 10, 2024

⋮

great grahp, I wonder if there is graphical descripton non Distribution that we can use to explain to sales team, non-data experts?

↩ **Reply**   👍

(https:/   **Yossr Hammad (https://classroom.emeritus.org/courses/9054/users/229118)**

       Apr 4, 2024

⋮

Dear Management,

As the lead data science of the corporation i have conducted analysis of the inventory we need for the coming busy weekend of our sales for the 12 stores.

the current situation is that we have total of 9500 units for all 12 stores, based on predictive modeling and my analysis i came a conclusion the this inventory wont be sufficient, in this case the fill rate will only be 45%

 Each store needs 1000 unit then the 12 stores would need 12000 units, 9500 is a low number of inventory .
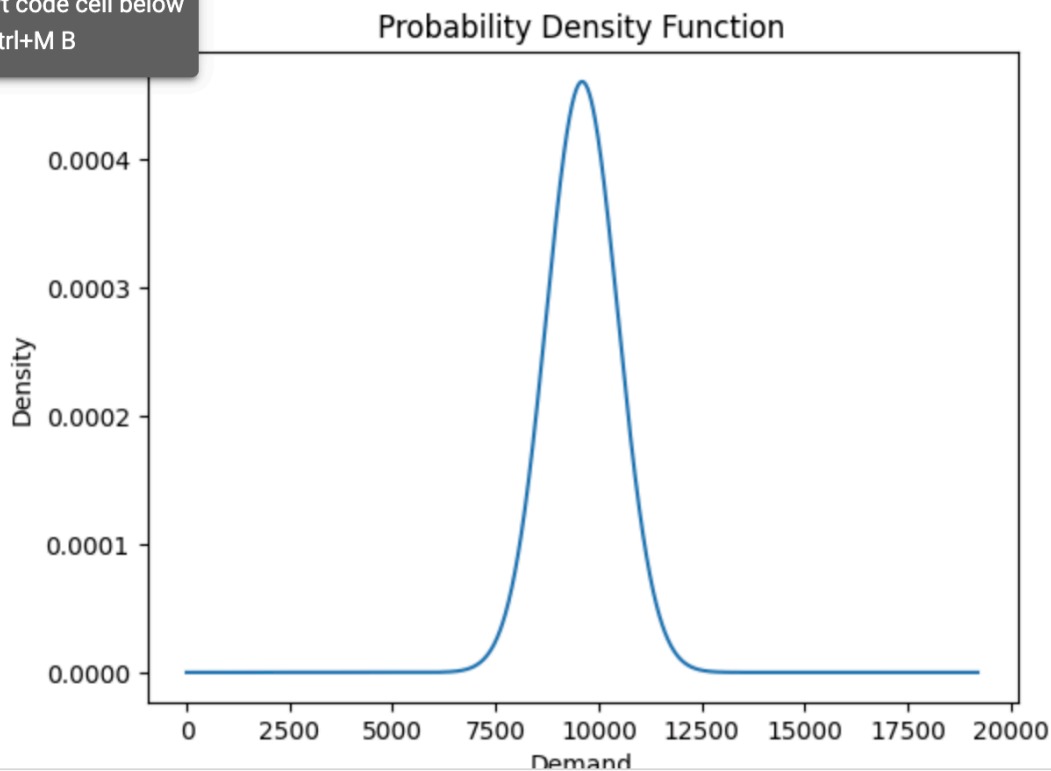
Based on the insight gained from Try-It Activities 2.3 and 2.4 i have calculated that we will need to order additional 1524 units.

I've came to this conclusion by utilizing the historical data and apply predictive modeling techniques to be able to estimate the demand for this weekend. combining all 12 stores together i calculated the total inventory for all of the stores.

with the additional inventory the fill rate is estimated to be 95% which will lead to higher customers satisfaction and optimize sales opportunities.
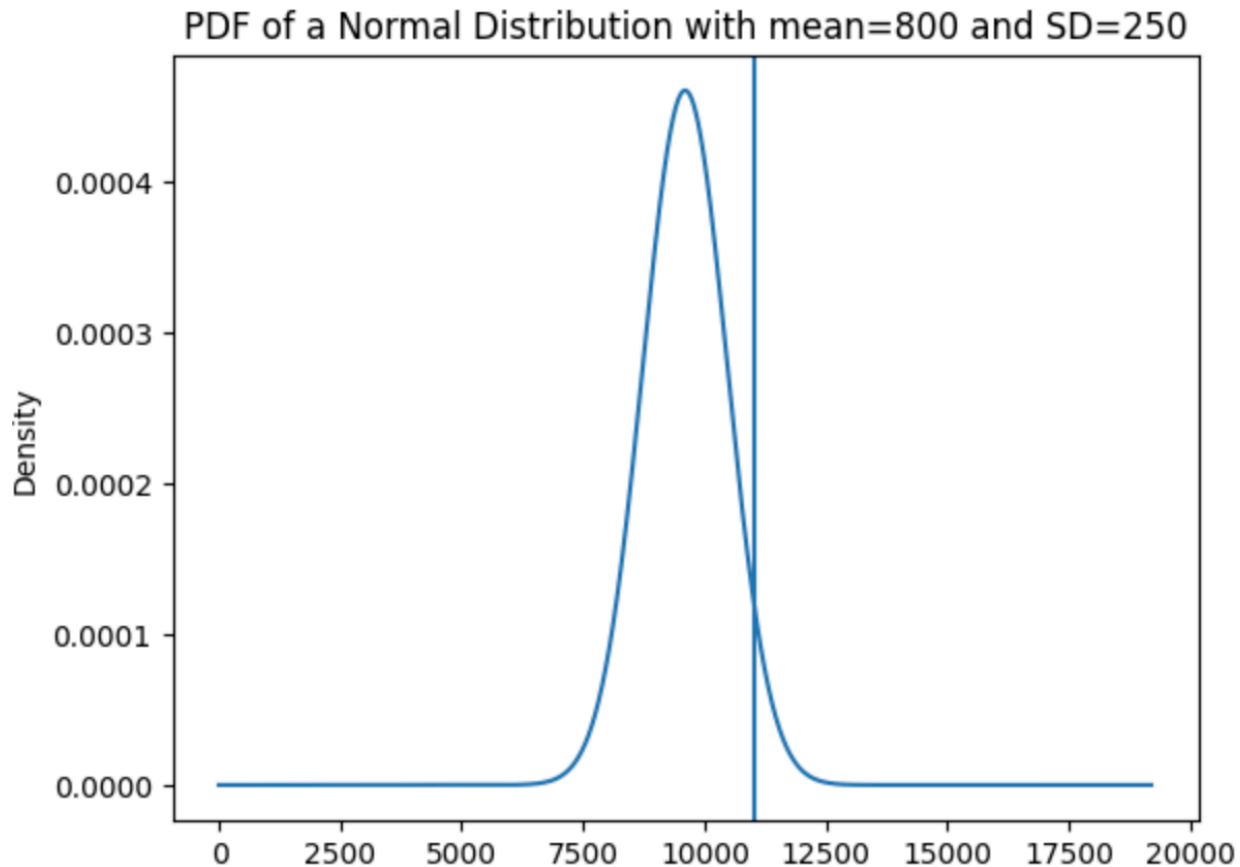
In conclusion, i recommend we move forward to order the additional inventory to ensure customers satisfaction and profit maximization.

Thank you

Yossr Hammad

lead data science :)

Edited by **Yossr Hammad (https://classroom.emeritus.org/courses/9054/users/229118)** on Apr 4 at 11:08pm

↩ **Reply**   👍

(http   **Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)**
Apr 8, 2024

Hi Yossr,

I really liked the fact that you included these graphs in your email!

Because we are assuming a role I am not sure if you we need to include "Based on the insight gained from Try-It Activities 2.3 and 2.4"

I also like how you concluded with the recommendation.

Edited by **Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)** on Apr 8 at 9:44pm

↩ **Reply**   👍

(http   **Yossr Hammad (https://classroom.emeritus.org/courses/9054/users/229118)**
Apr 9, 2024

Hello Roy,

Thank you for your note. i am assuming those try it activities are previous projects that i should refer to to justify my memo and my reasoning to increase the stock.

↩ **Reply**   👍

(http   **Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)**
Apr 10, 2024

That's a good way to put it Yossr. Thanks again for sharing the graphs.

↩ **Reply**   👍

(http   **Jignesh Dalal (https://classroom.emeritus.org/courses/9054/users/229173)**
Apr 9, 2024

Hi Yossr,

I definitely agree with your post, nonetheless I figured out the second graph's title is not quite correct, by looking at the bell-curve I would say that the mean is around 9600 and not 800, same for the sd.

Also, in this same graph there is a vertical blue line, it would have been nice to have a label in there. I know that we haven't learnt to tweak the graphs yet, but it's something to point out.

All the rest is perfect, great way to show it.

↩ **Reply**   👍

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)

Apr 5, 2024

⋮

Subject: Potential implications of the current planned stock level for the upcoming Busy weekend

Good day, Sales executive,

This communication is regarding the planned stock level at the central warehouse (serving all 12 stores) for the busy weekend.

Please find below the key analysis points for your review and kind consideration:

Scope of Analysis

Weekend of *xx Month 2024*, known to be a *busy weekend*

Analysis Objective

1. Quantify with a certain degree of confidence the impact of the planned stock level (9,500 units), on the company's fill rate.
2. Present alternatives to management for mitigating the loss of sales risk, and the fill rate and inventory level required for each alternative.

Analysis Business Parameter

Parameter	Per Store	12 Stores
Planned stock level for 12 stores	----	9,500
Previous (historical) average sales during the busy weekend (in focus)	800	9,600
Deviation from the average during the weekend in focus (standard deviation).	250	866

Sales during 68% of the previous *busy weekends* on record:

- per store: were between 550: and 1050 units.
- overall sales (12 stores): were between 8,734: and 10,466 units.

Analysis Objective 1

The planned inventory of 9,500 units will have a fill rate of 45.4% for the busy weekend.

Maintaining the current inventory plan would be a substantial opportunity loss for the company.

Analysis Objective 2

	Fill rate (Confidence Level)	Target inventory (for all stores)
Alternative 1	85%	10,498
Alternative 2	90%	10,710
Alternative 3	95%	11,025

Result graphs using Python (statistical analysis tool)
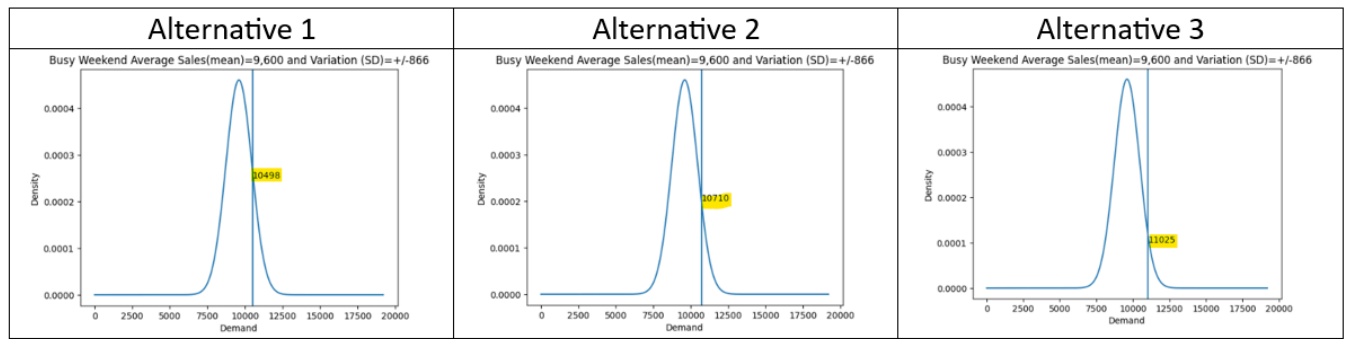
Recommendation

Considering the cost of opportunity loss (i.e. fill rate of only 45.4 %) we strongly recommend revising the planned inventory level for the busy weekend to one of the above 3 alternatives. The associated cost of increasing the inventory level or other potential tradeoffs are key considerations when deciding on the alternative.

Please let me know should more details or clarification are required.

Kind regards

Edited by **Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)** on May 7 at 12:06pm

↩ **Reply**   👍   (1 like)

(http   **Manjari Vellanki (https://classroom.emeritus.org/courses/9054/users/231480)**
           Apr 5, 2024

Well structured memo :)

↩ **Reply**   👍   (1 like)

(http   **Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)**
           Apr 8, 2024

Thanks Manjari for reviewing the Memo and the feedback.

↩ **Reply**   👍

(http   **Turki Alghusoon** (https://classroom.emeritus.org/courses/9054/users/229165)
Apr 6, 2024

Hi Haitham,

Very detailed analysis!

- I like how you provided multiple alternatives with a statistical representation for each alternative.
- I also like how you translated the mean and standard deviation into business language by describing them in the context of historic sales performance during similar periods.
  - One suggestion I have to show that same information but expand it to be within 2 standard deviations of the mean (95%) instead of 1 standard deviation (68%). I think that might further boost management's confidence in the sales figures included in the interpretation.

↩ **Reply**   👍 (1 like)

○

(http   **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864)
Apr 8, 2024

Good day Turki

Your 2SD suggestion would surely be more impactful. The point is well noted for future analysis, with thanks.

↩ **Reply**   👍

○

(http   **Mariana Flores** (https://classroom.emeritus.org/courses/9054/users/237198)
Apr 7, 2024

Hi Haitham, so nice to meet you. Great post, including a balance of supply and demand as well as outlining the advantages of risk pooling by incorporating multiple demand scenarios, what those implications mean, and providing multiple alternatives and recommendations allows for well-rounded and informed decision making.

Demand planning and inventory management are fascinating – thank you for sharing.

↩ **Reply**   👍 (1 like)

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)
Apr 8, 2024

Thanks, Mariana, for the detailed and kind feedback.

Edited by **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864) on Apr 8 at 8:59pm

↩ **Reply**   👍

Diego Milanes (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/228518)
Apr 7, 2024

Dear Haitham,

Thanks for your well-structured analysis. Regarding your graphs, I wonder why you considered it important to add all the decimals in the forecasted stock. Are those decimals significant in any way?

Thank you very much

↩ **Reply**   👍   (1 like)

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)
Apr 8, 2024

Good day Diego

The point is well noted and incorporated with thanks.

Edited by **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864) on Apr 8 at 8:59pm

↩ **Reply**   👍

Jignesh Dalal (https://classroom.emeritus.org/courses/9054/users/229173)
Apr 9, 2024

Haitham, this is impressive, it's clear all the effort you put into this. I noticed that you changed the titles of the graphs and added labels to the fill rate percentile, that looks very informative and correct. The only question I have is why you picked up 85%, 90% and 95% and not 90%, 95% and 99% as it's used in statistics?

I don't think this is a mistake but I'm curious

↩ **Reply**   👍

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)
Apr 10, 2024

Thanks Jignesh for the feedback. Putting forawrd 85% , 90% 95 % fill rates were an arbitrary business choice offering 3 levels of "modorate" risk of associated investment (stocking up to attain over 95% fill rate follows a steeper curve caused by operating beyond the second SD). In future I would emmualte Diego Milanes *addtional units vs Fill rate graph (memo below)*. In my openion its a perfect decsion support tool on the subject.

↩ **Reply**   👍

Isabella Tockman (https://classroom.emeritus.org/courses/9054/users/207395)
Apr 20, 2024

Hi Haitham,

Your memo is very impressive! Very well done!

↩ **Reply**   👍   (1 like)

Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)
May 7, 2024

Thanks, Isabella for taking the time to review and feedback.

↩ **Reply**   👍

Mariana Flores (https://classroom.emeritus.org/courses/9054/users/237198)
Apr 5, 2024

Hi Inventory Management Team,

In preparation for the busy weekend ahead, please find our agreed upon inventory analysis. To maximize the probability that we will be able to satisfy demand across all 12 combined stores and meet guaranteed supply of 12,000 units - the respective fill rate is 99.72%. This takes into account an expected total demand of 9,600 units with a standard deviation of 866 as well as a shared inventory which can be moved between stores. Our current combined inventory is 9,500. *Thus, an additional 2,500 units will need to be ordered to meet weekend demand.*

For additional context below is a breakdown across various fill rates and respective inventory units, applying the same demand assumptions.

Fill Rate	Total Units Required	Current Units in Warehouse	Additional Units Required
90.00%	10,710	9,500	1,210
95.00%	11,025	9,500	1,525
99.75%	12,000	9,500	2,500
99.99%	12,821	9,500	3,321

Please let me know if you have any questions or concerns.

All the best,
Mariana
Lead Data Scientist, Inventory Management

↩ **Reply** 👍

Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)

Apr 6, 2024

Very detailed response and really liked that you run different fill rates with a sensitivity table around it. Great idea.
Thinking that an idea output would be a 2 variable sensitivity table with the Fill Rate on one axis and different standard deviations on the other axis (would be a lot of work but more accurate)

↩ **Reply** 👍

Timothy Andrew Ramkissoon (https://classroom.emeritus.org/courses/9054/users/226697)

Apr 8, 2024

I appreciate that your response is clear and concise and provides a visualization of the data being presented. From a management perspective this would make it easier to understand and allows for a quick decision-making process.

↩ **Reply**   👍

Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)
Apr 10, 2024

I think this get the attention in number of units, a regular sales team will get the idea and size of business, for this to fully get interest adding money and business potentially not gained, will trigger actions

↩ **Reply**   👍

Isabella Tockman (https://classroom.emeritus.org/courses/9054/users/207395)
Apr 20, 2024

Your response is impressively concise, covering all aspects without leaving room for uncertainty. Well done!

↩ **Reply**   👍

Diego Milanes (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/228518)
Apr 5, 2024
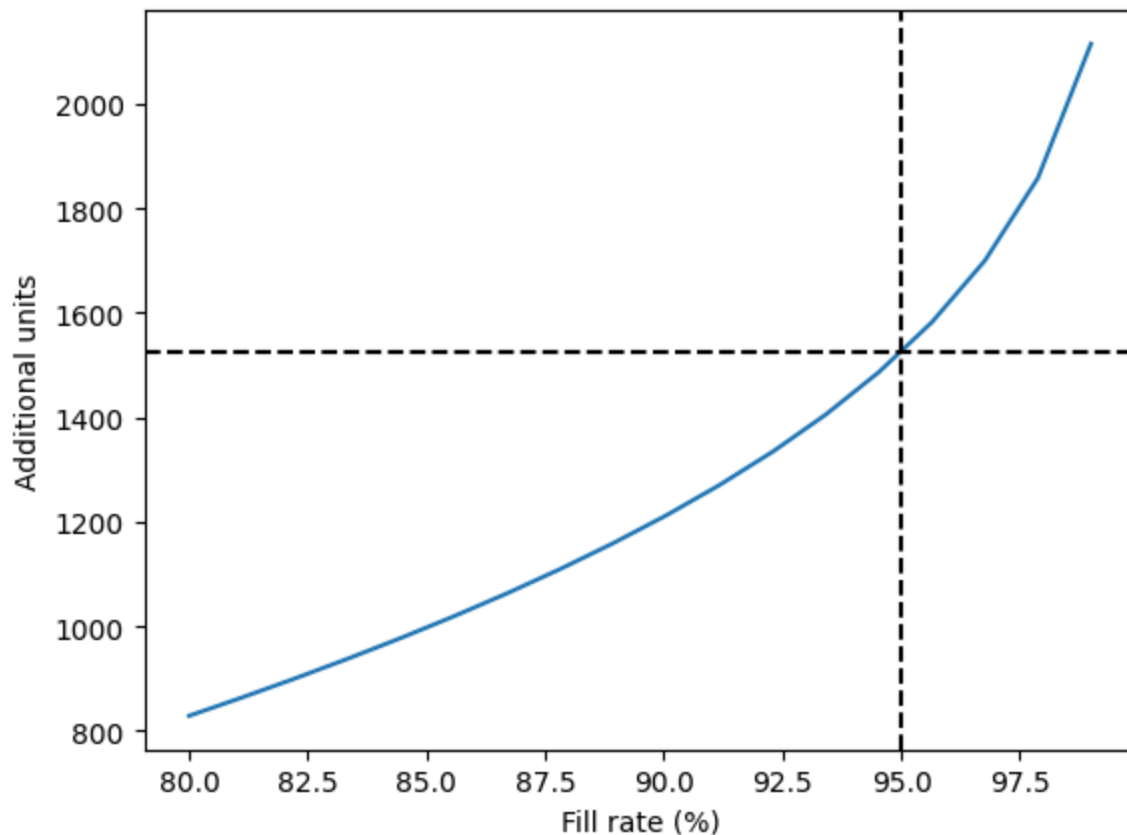
Dear Srs. Management Office

I have been informed that currently there are 9500 units in our inventory, representing only 45% of the fill rate with the usual model of demand for the 12 stores combinned. To accommodate the demand for the upcoming weekend, a last-minute order to the retailer for 1525 units has to be placed as soon as possible. These additional 1525 units, combined with the 9500 units reported already in the inventory, will represent 11024 units in total, which are expected to be enough to guarantee a fill rate of 95%.

Attached is a plot showing the number of additional units needed as a function of the desired fill rate. The graph is computed taking into account that our stores share stock and that stock can be easily moved between stores. It uses our traditional demand model, which assumes a

mean demand of 800 products with a standard deviation of 250 units in each store. Feel free to change the order according to the graph if you consider that a different fill rate must be guaranteed.

Best regards,

The Lead Data Scientist

↩ **Reply**   👍 (1 like)

(http   **Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)**

Apr 6, 2024

⋮

Hi Diego,

Including the line graph to illustrate the relationship between the additional units and the expected fill rate is quite powerful, as it shows management the full spectrum of possibilities. I like how you used it to give management the freedom to ultimately decide on the order quantity with full understanding of the impact on expected fill rate.

↩ **Reply**   👍 (1 like)

(http   **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864)

Apr 8, 2024

Good day Deigo

The graph you included is pivotal, concisely summarising the full predictive model. Very good decision to create and include it in the memo.

could you please share the (python) function used to create it.

Thanks

↩ **Reply**   👍

(http   **Diego Milanes** (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/228518)

Apr 9, 2024

Hi Haitham

The relevant part added to the try_it python notebook is:

```
percentage = np.linspace( 80., 99., 1)
ppf = stats.norm.ppf(percentage/100.,mean,std)-9500
plt.plot(percentage,ppf)
plt.axvline(95, color='black', linestyle='--')
plt.axhline(stats.norm.ppf(0.95,mean,std)-9500, color='black', linestyle='--')
plt.ylabel('Additional units')
plt.xlabel( 'Fill rate (%)')
```

cheers

↩ **Reply**   👍 (1 like)

(http   **Haitham Farag** (https://classroom.emeritus.org/courses/9054/users/233864)

Apr 10, 2024

invalauble ...

Thanks for sharing, Diego

↩ **Reply**   👍

○

(http   **Chris Cosmas (_He/Him_) (https://classroom.emeritus.org/courses/9054/users/226607)**
Apr 15, 2024

⋮

Hello Diego,

Very nice graph it is much more understandable now with the visual aid.

I had a question in regards to the plot range it is my understanding that the rang is set by the following two lines of code:

percentage = np.linspace(80., 99., 1)

and

plt.plot(percentage,ppf)

Would it be possible to also use a normal python range? [0.8,0.99,1]

Or is there something I am missing with the np.linspace function does it bring anything new to the graph?

↩ **Reply**   👍

○

**(http**   **Roy Nunez (https://classroom.emeritus.org/courses/9054/users/229552)**
Apr 8, 2024

⋮

+1 on this out of the box graph!! Providing several possibilities/fill rates.

My thought on your letter: I think it would also be good to suggest further follow up discussions based on these findings with he management team, versus your current ending.

Good stuff Diego!

↩ **Reply**   👍   (1 like)

○

(https: **Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)**
Apr 6, 2024

⋮

Dear Management,

I am writing you as the lead data analyst of the corporation ahead of a busy weekend to address our inventory needs and make sure that we can satisfy demand. We currently own 12 stores and are preparing for a busy weekend of sales, knowing the stores have a combined 9,500 units in inventory that won't be enough to satisfy weekend demand fluctuations, we have to construct a Standard Normal Distribution and use our toolkit to map out potential scenarios. Our objective will be to make sure we can satisfy demand in different scenario at a high fill rate of 99% and we will map out different scenarios, providing the quantitative support for our recommendations.

The current inventory is not enough as a combined inventory of 9,500 units could accommodate approximate fill rate of 45.6% customers which is very low (Function cdf = stats.norm.cdf(guaranteedSupply,mean,std)). This won't work as we will most likely fall short of demand.
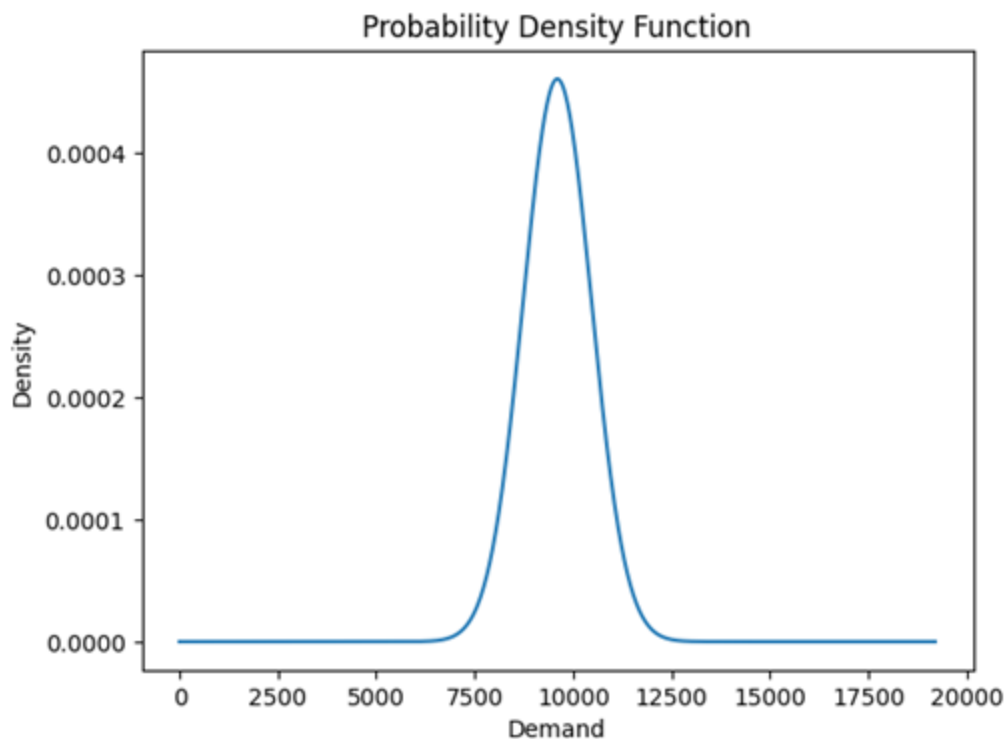

To obtain a **95% fill rate**, we would need an inventory of **11,024 units** by utilizing our same Standard Normal Distribution and the function
ppf = stats.norm.ppf(0.95,mean,std). This leaves a 5% risk of falling short that weekend, which is too high.

Recommendation:

If we want to have no risk of filling customer orders, my recommendation is to use a **99% fill rate** and this would require **11,614.7 units** which would be our recommendation to management.

Advantages of Risk pooling: spreads out costs of 12 different locations centralized to one warehouse allowing for flexible and efficient inventory management and managing the demand variations between stores and other seasonal factors

PDF of a Normal Distribution with mean=800 and SD=250
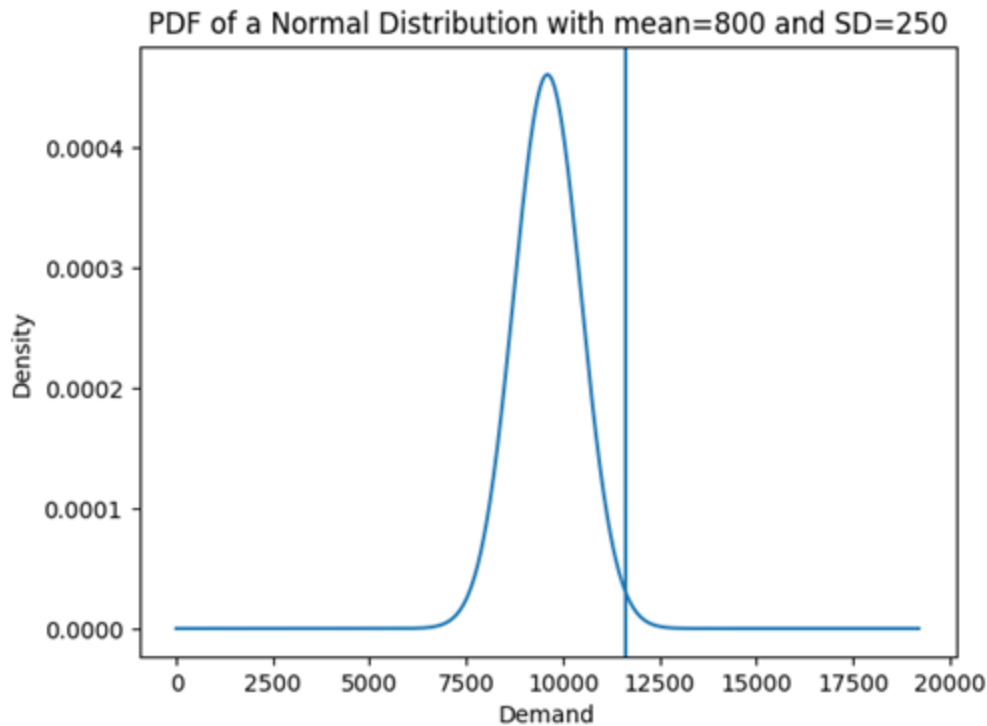
Edited by **Javier Di (https://classroom.emeritus.org/courses/9054/users/226884)** on Apr 6 at 7:53pm

↩ **Reply**   👍

Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)

Apr 6, 2024

Dear Management Team,

Main Message:

We wanted to bring to your attention that we will need to increase inventory by 2,500 units to achieve a 100% fill rate during the upcoming weekend.

Summary of Analysis:

1. At the current inventory level of 9,500 units, we predict to only achieve a 45% fill rate.
2. To achieve a near 100% fill rate (99.7%), we will need a total inventory level of 12,000 units.
3. The current inventory gap is 2,500 units (based on points 1 and 2 above). Please note:
   1. The additional 2,500 units represent a 26% increase in inventory,
   2. Such an increase is expected to boost our fill rate for the weekend by 122%.

We have summarized our analysis in the table below:

Legend	Category	# of Units	Predicted fill rate
a	Current Inventory Level	9,500	45%
b	Recommended inventory Level	12,000	99.7%
c = b - a	Gap to Recommendation	2,500	54.7%
d = c / a	Marginal increase	26%	122%

Should you need any additional information, we would be happy to walk you through the detailed analysis.

Best,

The Data Science Team

Edited by **Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)** on Apr 6 at 9:07pm

↩ **Reply**   👍

(http   **Ahmad Abu Baker** (https://classroom.emeritus.org/courses/9054/users/234460)

Apr 7, 2024

⋮

Dear Turki,

Hope all is well.

Thank you for the comprehensive analysis. I agree that increasing our inventory by 2,500 units to hit a 99.7% fill rate is a prudent move for the upcoming sale.

It's impressive to see that such an increase could boost our fill rate substantially. While we should be mindful of potential overstock, the projected sales uplift justifies this strategy.

The additional information that a 26% increase in our inventory could potentially boost our fill rate by 122% is particularly striking. It highlights not only the necessity of meeting the increased demand but also the benefits of having a buffer that can cater to any unexpected surges in sales.

Best,

↩ **Reply**   👍

(http   **Dawn Prewett** (https://classroom.emeritus.org/courses/9054/users/233112)

Apr 7, 2024

⋮

Turki,

I really appreciated the brevity of your message and found the data presented of particular interest. The only concern I would have about the message presented here the possible confusion that the presentation of the marginal increase might present. I have managers who would have lept at the 122% in the fill rate column and assumed that meant that we were trying to increase to 122% despite what everything else says. This really just highlights the importance of knowing your audience when you write such vital emails.

Dawn

↩ **Reply**   👍

(http   **Turki Alghusoon** (https://classroom.emeritus.org/courses/9054/users/229165)

Apr 8, 2024

⋮

Hi Dawn,

Thank you for your feedback. I actually had the same thought after I put it together :D which is partially why I ended up adding the legend column to highlight calculations. That being said, if you send this to memo to 10 people chances are at least 2 recipients will assume a 122 fill rate.

I thought it was important to highlight the marginal increase component since it strongly clearly highlight the high expected ROI from purchasing additional inventory. However, I am not sure what would be the ideal way to weave into the memo and I am interested to know if you have any thoughts on that.

Best,

Turki

↩ **Reply**   👍

(http   **Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)**
       Apr 9, 2024

Turki,

Very good points and it's clear that you understand your stakeholder's and how they view information.

Dawn

↩ **Reply**   👍

(http   **Haitham Farag (https://classroom.emeritus.org/courses/9054/users/233864)**
       Apr 8, 2024

The decision to include the marginal increase and its associated ROI is very tactful.

Thanks for sharing, Turki

↩ **Reply**   👍

Dawn Prewett **(https://classroom.emeritus.org/courses/9054/users/233112)**

Apr 7, 2024

As you know, our stores are preparing for an incredible sales weekend. I received our inventory reports from the warehouse manager this morning and discovered that we are down to 9500 units of our most popular model and provides a 55% chance that we <u>will not</u> meet customer demand this weekend unless take immediate action to increase our inventory levels. Failure to increase our inventory levels sufficiently puts us at significant risk of lost sales and deteriorated customer satisfaction.

Given the hype and high visibility regarding this sale, we had planned to meet at least a 95% fill rate. To maintain that, we will need to increase our inventory to at least 11024 units. Fill rate reflects the likelihood that our inventory levels will meet demand.

I am aware of the challenges and costs associated with obtaining these additional units on such short notice. Fortunately, because we have a network of 12 stores that share inventory, we actually benefit from inventory risk pooling, which improves our ability to manage fluctuations in demand and improves our predictive modeling, so even small increases in our inventory can be incredibly impactful. Therefore, even if we secure only an additional 1000 units, our chances of meeting customer demand this weekend will increase to 85%.

Total Units	Additional Units	Fill Rate
9500	0	45%
10329	829	80%
10498	998	85%
10709	1209	90%
11025	1525	95%
11614	2114	99%

Edited by **Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)** on Apr 7 at 8:34am

↩ **Reply**   👍 (1 like)

○

Turki Alghusoon **(https://classroom.emeritus.org/courses/9054/users/229165)**

Apr 7, 2024

Hi Dawn,

Very good analysis. Cool idea to color code the alternatives to bring attention to the respective expected outlook. I also liked how added a point on the risks associated with current inventory levels as it brings home to management why this analysis matters.

Best,

Turki

↩ **Reply**   👍

○

(http **Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)**
                Apr 7, 2024   ⋮

Turki,

Thanks! I crafted the message as if I were talking directly to my current manager. I've noticed he really benefits from visual cues. He's incredibly sharp but always has a lot on his plate, so making the key points stand out really makes a difference to him.

Dawn

↩ **Reply**   👍

○

(http **Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)**
                Apr 8, 2024   ⋮

great table

↩ **Reply**   👍 (1 like)

○

(http **Todd Engle (https://classroom.emeritus.org/courses/9054/users/228910)**
                Apr 9, 2024   ⋮

I really dig the chart. Management loves this stuff, especially the 'green'!   It gives them the sense that they are making a more informed decision. If they can't come up with the additional units, or they simply choose not to, they can see the impact. Thank you, well done.

Reply 👍

Priscilla Annor-Gyamfi (https://classroom.emeritus.org/courses/9054/users/226376)
Apr 9, 2024

⋮

Nice write-up Dawn. The visuals in there makes it more interesting and relatable.

Reply 👍

Dawn Prewett (https://classroom.emeritus.org/courses/9054/users/233112)
Apr 9, 2024

⋮

Thanks for the positive feedback on my color-coded table. It's interesting to compare our approaches, including my visual method versus others' more technical examples. This underscores the importance of understanding our decision-makers' preferences. Everyone processes information differently and thus it's important to recognize and adapt when giving information to your stakeholders. Your insights highlight the need for flexibility in our presentation methods.

Reply 👍

Ahmad Abu Baker (https://classroom.emeritus.org/courses/9054/users/234460)
Apr 7, 2024

⋮

Subject: Inventory Recommendation for Upcoming Busy Weekend Sales

To: Management Team

From: Ahmad Baker, Lead Data Analyst

Date: April 7th 2024

Dear Management Team,

As we approach the busy weekend sales period, I have conducted a thorough analysis of our inventory needs for the 12 stores under our corporation. This memo outlines the necessary inventory adjustments to meet our customer demand effectively and ensure a high fill rate.

Current Inventory and Demand Analysis

Our current shared inventory stands at 9,500 units. Based on the sales patterns and statistical analyses conducted in Try-It Activities 2.3 and 2.4, this stock level is insufficient to guarantee a desirable fill rate during the anticipated surge in customer traffic this weekend.

Statistical Findings and Inventory Requirements

The analysis conducted using a normal distribution model, factoring in the expected demand and standard deviation, suggests that to achieve a fill rate of 95% across all stores, we would need approximately 11,024 units in total inventory. Given our current inventory, this indicates a shortfall of around 1,524 units.

Projected Fill Rates

This increase in our inventory investment correlates with the following fill rates:

- With our current inventory of 9,500 units: 45% fill rate
- An additional 829 units for a total of 10,329 units: 80% fill rate
- An additional 998 units for a total of 10,498 units: 85% fill rate
- An additional 1,209 units for a total of 10,709 units: 90% fill rate
- An additional 1,525 units for a total of 11,025 units: 95% fill rate
- An additional 2,114 units for a total of 11,614 units: 99% fill rate

Guaranteed Fill Rate

With this adjusted inventory level, we can guarantee a fill rate of approximately 95%. This means that we can satisfy the demand of 95% of our customers during the busy weekend, minimizing the risk of stockouts and maximizing sales opportunities.

Recommendation

I recommend ordering at least 1,600 additional units to account for any unexpected increase in demand. This will bring our total inventory to around 11,100 units, comfortably covering the estimated requirement and providing a small buffer.

Conclusion and Next Steps

Ensuring we have the right inventory levels is crucial for meeting our customer's needs and maximizing revenue during peak sales periods. The additional inventory not only helps in achieving a high fill rate but also reinforces our reputation for reliability and customer satisfaction.

I am looking forward to your feedback and am ready to implement these recommendations promptly to prepare for the upcoming sales weekend.

Best regards,

Ahmad Baker

Edited by **Ahmad Abu Baker (https://classroom.emeritus.org/courses/9054/users/234460)** on Apr 7 at 4:19pm

↩ **Reply**   👍   (1 like)

(http   **Turki Alghusoon (https://classroom.emeritus.org/courses/9054/users/229165)**

⋮

Apr 7, 2024

Hi Ahmad,

Good analysis! I like adding the sensitivity analysis to the memo, which gives management a full understanding of the available options and their expected impact.

↩ **Reply**   👍

(http   **Lee Lanzafame (https://classroom.emeritus.org/courses/9054/users/231975)**

⋮

Apr 8, 2024

100% agree, great work

↩ **Reply**   👍

(https:/   **Timothy Andrew Ramkissoon (https://classroom.emeritus.org/courses/9054/users/226697)**

⋮

Apr 8, 2024

Dear Management,

As we prepare for the upcoming busy weekend of sales across our 12 stores, I would like to share our inventory order and fill rate strategy to ensure optimal customer satisfaction. Our stores operate with a shared inventory system, allowing us to move stock between locations as needed. However, our current combined inventory of 9,500 units may not be sufficient to meet the demands of all our customers during this weekend.

To satisfy customer demand during the weekend, considering the shared inventory across all 12 stores along with the statistical properties of demand distribution, we recommend having an inventory of approximately 12,000 units (this fulfills a fill rate of 99.72%). This would mean **ordering an additional 2,500 units** to bolster our inventory. Customers can confidently expect

their desired product to be available as this calculation takes into account the collective demand and ensures that we have adequate stock levels without experiencing excessive overstocking.

I propose placing an order for additional inventory without delay to allow for sufficient lead time and seamless integration into our existing supply chain operations. Additionally, I recommend implementing robust inventory monitoring and management practices to optimize stock levels and address any fluctuations in demand effectively. This would minimize the risk of a similar event occurring where we might be short on inventory stock for a major weekend/event.

Thank you for considering these recommendations. Please do not hesitate to reach out if you have any questions or require further clarification.

Best Regards,

Timothy

Edited by **Timothy Andrew Ramkissoon** (https://classroom.emeritus.org/courses/9054/users/226697) on Apr 8 at 1:26am

↩ **Reply**   👍

○

(https://   **Lee Lanzafame** (https://classroom.emeritus.org/courses/9054/users/231975)   ⋮
   Apr 8, 2024

Hi team,

Using probability statistics I've worked out that a 95% fill rate requires 11,024 units using the probability point function (stats.norm.ppf(0.95,mean,std). Currently the stores have 9,500 units, that's (11,024 – 9,500) = 1,524 units short or 45% probability that we can meet demand without running out of stock using the cdf function stats.norm.cdf(9500,mean,std).

I recommend that we order another 1,524 units to meet the 95% fill rate described in the previous example.

Thanks

Lee

↩ **Reply**   👍   (2 likes)

○

(https://   **Roy Nunez** (https://classroom.emeritus.org/courses/9054/users/229552)   ⋮

Apr 8, 2024

Subject: Inventory Requirements for Upcoming Busy Weekend Sales

We have determined that our combined inventory of 9,500 units across 12 stores **will not suffice** to meet the expected demand, at a fill rate of 46%. This can lead to negative impacts on our customer's experiences in events where some customers will not be able to purchase our products on a busy weekend.

Based on our analysis, I am providing the following recommendations:

To achieve a **95% fill rate**, we recommend increasing inventory to **11,024 units**. This requires ordering an additional **1,524 units**.

To achieve a **99% fill rate**, we recommend increasing inventory to **11,615 units**. This requires ordering an additional **2,115 units**.

These recommendations are the result of a thorough analysis and based on statistical models of our historical sales data and inventory levels, taking into account factors such as the average demand, standard deviation, and the 95% and 99% fill rates across all 12 stores.

Increasing our stock levels by the recommended amounts will ensure sufficient stock with a buffer for individual store variations, in where we can redistribute inventory between stores due to their proximity to each other. This data-driven strategy will minimize lost sales due to understocked inventory and increase customer experiences with our brand, while minimizing excess inventory costs.

I am open to discussing this further. Feel free to raise any questions or concerns, and I will help in providing further clarity and engage with the logistics team as soon as possible to ensure we are prepared for the upcoming busy weekend.

Thank you,

Roy Nunez

Lead Data Scientist

↩ **Reply**   👍   (1 like)

○

Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)

(https:/

Apr 8, 2024

⋮

Dear sales mangament team:

Our gruop af Data Science has made thorough analysis of or inventory, specially for this upcommig anniversary sales weekend.

The good news is thator our 12 stores we have 9500 units in inventory.

The not so good news is that our Data Scientists have predicted that we need over 11,000 Units.

We encourage the sales team and logistics team to take some preventive actions, which include, but not limited to the following:

- Aquire inventory to match or pass 11,000 Units of total inentory
- Have a dedicated logistics team to act fast on the among store inventory movement, as we anticipate some store may run out of inventory
- Prepare a team to take orders to be fullfilled later, within an offer due to lack of inventory
- Get ready to raise the prices to control oversell and lack of inventory
- Prepare a bundle offer to deliver at later time with a plus, to maximize sales and avoid lack of inventor

All those actions are not unique, can be one or more applied at the same time

The reason of this memo, is informative for you to take the most suitable action, as the facts, pointed above by our sales team have a 95% prediction (Fill Rate) that our sales will exceed 11,000 units and we currently have 9500 inventory units for this weekend

Sincerely

The Data Science team

Edited by **Ricardo Anaya (https://classroom.emeritus.org/courses/9054/users/228915)** on Apr 8 at 3:45pm

↩ **Reply**   👍

○

(http   **STEPHEN HUTSON (https://classroom.emeritus.org/courses/9054/users/233645)**   ⋮

Apr 10, 2024

Great response Ricardo! I think it was really helpful to see that you went beyond just providing the recommended inventory the team would need to acquire by giving practical suggestions to the leadership team around preventative actions they can take to take better precautions in the future. A very good approach of using both the statistics but also incorporating the business context.

↩ **Reply**   👍

○

(https: **Roman Jazmin (https://classroom.emeritus.org/courses/9054/users/225803)**   ⋮

Apr 9, 2024

To Management and those concerned:

This is in reference to our 12 stores that have a combined total of 9,500 units in inventory shared among all branch locations.

After carful analysis of our total inventory and with a busy weekend of sales expected soon, I believe that there is not enough inventory to satisfy customer demand.

The reason being that with an expected total demand of 800 units per store, 12 stores in total, standard deviation of 250, and number of iterations set to be 1,000 add that with a guaranteed supply total of 9,500 (792 units per store), we get a fill rate of 45.41%, which is not enough. At this rate, we will only be able to fulfill less than half our orders.

Now to satisfy customer demand with a satisfactory fill rate, with the expected total demand per store the same, 800, total number of stores still 12, with the standard deviation and number of iterations the same, 250 and 1,000 respectively, if there are 1,000 units are in stock at each branch location, we get a fill rate of 99.72%. If we want to fulfill 95% of all orders, then we will need at least 11,025 units.

I respectfully welcome any feedback from anyone on this matter and open to meeting with as many people as possible to prove my case and findings. I am open to further discussing anyone's concerns.

Thank you,

Roman Jazmin

↩ **Reply**   👍

(http **Shahrod Hemassi (*He/Him*)** (https://classroom.emeritus.org/courses/9054/users/224267)   ⋮
Apr 9, 2024

Hi Roman,

Thanks for this excellent analysis. I believe your analysis is correct that we would need 11,025 units to reach a 95% fill rate with the other parameters that we have been using. Unfortunately, we will not be able to acquire 1,525 additional units on such short notice. I believe we can acquire 600 additional units. How much would that reduce our risk of running out of supply this weekend?

Thanks,
Management

↩ **Reply**   👍

(https: **Todd Engle** (https://classroom.emeritus.org/courses/9054/users/228910)   ⋮
Apr 9, 2024

Dear Bleecker Sneaker Management Team,

As we prepare for the busy sales weekend approaching, I'm writing to recommend a strategic increase in our total inventory across all stores.

Based on historical data and sales trends, and to ensure we can accommodate 95% of all customer orders, our Probability Density Function (PDF) analysis indicates a combined inventory level of 11,024 units is necessary across all 12 stores.

Our total inventory currently sits at 9,500 units. To bridge this gap and achieve the recommended 11,024 units, the team proposes an inventory increase of 1,524 units. This

strategic investment will minimize the risk of stockouts during the peak sales period, potentially leading to:

- Increased Customer Satisfaction
- Reduced Lost Sales
- Enhanced Brand Reputation by meeting our customer needs.

I'm happy to discuss this recommendation further and provide a more detailed breakdown of the data and analysis behind it.

Thank you for your time and consideration.

Sincerely,

Todd Engle

Edited by **Todd Engle (https://classroom.emeritus.org/courses/9054/users/228910)** on Apr 9 at 1:55am

↩ **Reply**   👍

(http **Priscilla Annor-Gyamfi (https://classroom.emeritus.org/courses/9054/users/226376)**
       Apr 9, 2024

Nice write up Todd. I like how you outlined the advantages this new recommended inventory increase will yield in your company. Third point, enhanced brand reputation by meeting our customer's needs really resonated well with me. Because at the end of the day, you want to project your brand as reliable and trustworthy.

↩ **Reply**   👍

(https:/ **MATT DEFREITAS (https://classroom.emeritus.org/courses/9054/users/220100)**
        Apr 9, 2024

Greetings,

For your reference I have provided some bullets of the message below. Essentially, the upcoming weekend's sales are expected to exceed current inventory and we will need to purchase additional units if we want to keep up with the demand. Please let me know if you would like to set up a call to discuss this topic more in depth.

- **Observation**: Inventory **SHORTAGE** – current predictions for all **12** of our stores with **5k** units of inventory will not be sufficient for the upcoming weekend sales and we are anticipating demand to be upwards of **1k** per store.

- **Recommended action:** Purchase **+3,924k additional units** equating to 13,424 units in total**.**
- **Justification:** Based on our analysis of recent trends and historical sales, we can identify that a **95%** fill rate is required to fulfill this weekend's cumulative demand. We observed this based on the Probability Density Function and calculated the Probability Point Function using the mean and standard deviation with the 95% fill rate target. If you feel the fill rate may be too aggressive or too conservative, this can be adjusted based on business need.

Thank you as always and please let me know if you have any questions.

↩ **Reply**   👍

Swati Sharma (https://classroom.emeritus.org/courses/9054/users/236938)
Apr 9, 2024

Hi Matt : If i may, i believe your mention of 13,424 units in total was to achieve a fill rate of 100%. Is that correct? Since, a 95% fill rate can be achieved between stores at 11,024 units. I do like how you have clearly separated the observation and recommended action with a justification section. this is something i will incorporate in my writing going forward. For management to take appropriate action, it would be good for us to give them a few options (for e.g. how many units you may need to achieve a 80% or 75% fill rate?). Check out my post regarding this subject where i added a table on this for future references.

Very nice to meet you!

Thanks

Swati Sharma

↩ **Reply**   👍

Jignesh Dalal (https://classroom.emeritus.org/courses/9054/users/229173)
Apr 9, 2024

To: Management Team,

Subject: Inventory Order Recommendation and Fill Rate Projections

Dear Team,

Aimed at achieving our goal to optimize fill rate throughout our 12 stores, enhancing operational efficiency, and reducing surplus stock. Using the provided dataset and statical framework to suggest ideal quantity of inventory orders.

Analysis of Inventory Requirement:

Our initial assessment was to understand the impacts of increasing inventory to meet the demands of 12 stores from a single warehouse. We drew insights into how our stores need scale with the expansion of our store network.

1. Single store fill rate: We would need 1211 units to ensure we have 95% of fill rate.

2. Scaling up Intuitively: For about 12 store of network, based on 1 store calculation we would need about 12*1211 = 14532 units to maintain 95% fill rate.

3. Insights from Advanced Statistics Analysis: Our statical analysis for scaling advocate a different fill rate to be maintained across all stores.

Recommendations:

Our Analysis propose:
1. Quality of Order: Its advisable to tailor our inventory based on analytical insights for a lower inventory to maintain 95% fill rate across all stores.

2. Projected Fill Rate: With projected strategy suggest to effectively meet customer demands while minimize inventory overhead.

Conclusion:

Adopting this data-driven inventory management empowers to efficiently meet customer demand and optimize inventory commitments. I recommend to discuss to finalize approach to inventory management.

Kind Regards,

Jignesh

Edited by **Jignesh Dalal** **(https://classroom.emeritus.org/courses/9054/users/229173)** on Apr 9 at 3:09am

↩ **Reply**   👍

○

(http   **Chris Cosmas (*He/Him*)** **(https://classroom.emeritus.org/courses/9054/users/226607)**   ⋮
        Apr 15, 2024

Hello Jignesh,

Thank you for your analysis.

It was my understanding through the previous try it activities that due to the shared inventory we would not be able to multiply the computed inventory needs for one store by the number of stores, as shared inventory allows stores to pool risk together. They informed us that the standard deviation will be computed differently which allows us to get a lower value for the needed inventory.

Please, let me know if I am mistaken or have overlooked anything in your anaylis.

Best,
Chris Cosmas

↩ **Reply** 👍

Koffi Henri Charles Koffi (https://classroom.emeritus.org/courses/9054/users/208039)
Apr 22, 2024

hi Jignesh , I like the detail explanation , if I m not wrong hear , the total units for our 12 store should be less 14532 unit since we are using a single store to supply all the 12 store . I m getting 11,024 unit for fill rate of 95%

↩ **Reply** 👍

Priscilla Annor-Gyamfi (https://classroom.emeritus.org/courses/9054/users/226376)
Apr 9, 2024

Memorandum

To: Management

From: Lead Data Scientist

Date: 4/9/2024

Subject: Inventory Forecast and Recommendations for Busy Weekend Sales

Dear Management,

As the lead data scientist for our corporation, I've conducted an extensive analysis to predict the inventory needs for the approaching busy weekend sales at our 12 stores. With our shared inventory system facilitating adaptable distribution of goods among all store locations, it's necessary to guarantee each store is sufficiently supplied to address customer demands. Nonetheless, according to our forecasts, our present cumulative inventory of 9,500 units will only meet 45.6% fill rate which will not be adequate to meet all customer requirements during this peak time.

To tackle this possible deficit and maintain high customer satisfaction, I've recognized the necessity of acquiring more units of inventory. My decision on the necessary quantity was influenced by several crucial factors:

2. **Historical data:** By examining past inventory data for similar busy weekends and targeting a fill rate of 95%, I observed that one store required an inventory of 1,211 units to achieve this threshold.
3. **Forecasting Model:** Utilizing advanced forecasting models, I projected that scaling to 12 stores, 11,024 units would be required to guarantee a 95% fill rate This prediction was derived by considering parameters such as mean, standard deviation, and assured supply across each store.
4. **Fill Rate Considerations:** Maintaining a high fill rate is essential for ensuring an optimal customer experience. A fill rate of at least 95% is widely recognized as acceptable in the realm of retail operations.

Following my analysis, I propose acquiring an extra 1,524 units of inventory to supplement our current stock. This move would raise our overall inventory to 11,024 units, serving as a safety net to manage any unforeseen spikes in demand.

I am confident that this proactive approach to inventory management will position us advantageously to address the demands of the impending sales event while upholding exceptional levels of customer satisfaction.

If further clarification or insights regarding this recommendation are needed, please do not hesitate to contact me.

Thank you for your attention to this matter.

Sincerely,

Priscilla Annor-Gyamfi

(Lead Data Scientist)

Edited by **Priscilla Annor-Gyamfi (https://classroom.emeritus.org/courses/9054/users/226376)** on Apr 9 at 7:27am

↩ **Reply**   👍

(https:/   **Shahrod Hemassi (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/224267)**

Apr 9, 2024

⋮

To Management,

I have conducted an analysis of our supply against the anticipated demand across our 12 stores, and I am concerned that we do not have enough supply to satisfy all of our customers during the upcoming busy weekend. We have a supply of 9,500 units. We typically expect a demand of 800 units per store for a total demand of 9,600 units and we utilize an independent standard deviation of 250. With the current supply, I have calculated a probability of only 45.4% that we will meet demand. Typically, we look to reach a probability of 95% that we will meet demand. In order to do that, we will need to increase our inventory to 11,025 units. That means that we will need to increase our supply by 1,525 units.

I understand that increasing supply by such a large amount on short notice will be difficult so I have run some calculations to provide you with information on how to reduce our risk of running out of supply. If we would like to reach a 75% fill rate, we would need to have a supply of 10,185 units which means that we would need to acquire 585 additional units. I am happy to run additional calculations if you are able to tell me either the fill rate that you would like to reach or the additional units that you are able to acquire. Please advise.

Regards,

Shahrod, Data Scientist

↩ **Reply**   👍

(https:/   **Swati Sharma (https://classroom.emeritus.org/courses/9054/users/236938)**

Apr 9, 2024

⋮

Hello All : After a careful and thorough analysis, here are some of my key takeaways that i would like the leadership team to consider.

1. We analyzed the historical data based on two key parameters provided : mean and standard deviation. These were the only parameters used and we had uncertainty around what the fill rate was going to be and how many units we need during this weekend.

2. Considering a busy sale weekend, we used the two inputs for identifying our probability distributions. When we used normal distribution for only 1 store, we were able to identify the fill rate based on demand for this weekend.

3. Using other probability functions, we can determine the number of units that would be needed to achieve a particular fill rate. Only considering 1 store, we needed at the minimum of 1211 units to achieve a fill rate of 95%.

4. However, when having to consider all 12 stores, we need a much higher number of units. Based on the analysis (using the baseline mean, variance, and standard deviation), below is a table of the approximate number of units needed to achieve its corresponding fill rate.

Number of Units (Approximate)	Fill Rate (%)
11024 units	95%
10184 units	75%
9819 units	60%
9500 units	45%

As seen in the table above, we would merely be able to achieve a 45% fill rate with only 9500 units available across stores.

Based on the analysis, i highly recommend that we increase the number of units available between the 12 stores to 11024 units to achieve the 95% fill rate.

↩ **Reply**   👍

Mhelissa Yayalar (https://classroom.emeritus.org/courses/9054/users/233590)
(http
Apr 15, 2024   ⋮

Hi Swati,

Your approach of communicating the different percentage of fill rate I think provides management some key things to consider in minimizing the risks of not having enough inventory or having too much inventory. Once the fill rate is met at 95%, we should also consider deploying real-time monitoring of the inventory during the weekend. The benefits of this should enable the company to adjust the levels, but also learn from how to improve the inventory. Specifically, studying the levels of inventory at each store will provide us a way to forecast dynamic allocations for certain weekends. Thus, resulting in optimize allocation of inventory every weekend while avoiding overstocking at any 12 stores.

For example, if one store faces unexpected demand fluctuations during the same weekend, then by gathering the data real-time, then we can use a normal distribution formula to predict the probability of selling the entire units for the weekend. For example, we can use the same values:

- mean = (9500/12) * 1 (stores)
- standard deviation = 250

Thanks,

-my

↩ **Reply**   👍

STEPHEN HUTSON (https://classroom.emeritus.org/courses/9054/users/233645)   ⋮

Apr 10, 2024

To whom it may concern:

After assessing our inventory and current demand rates, I have come to the following conclusion regarding our approach to meeting our customer's needs this upcoming weekend.

Based on historical data, our typical demand over the weekend for our stores is 800 units per store, with a standard deviation of 250 units. We currently have a combined 9500 units of inventory to satisfy demands of our 12 stores, which would likely not be enough to properly meet demands this weekend due to the fact that this would only give us a 45% fill rate.

My recommendation would be for us to aim for a fill rate of 97%, which would be above the average for other companies in our industry. In order to achieve this we will need 11,229 units of inventory meaning we will need to order an additional 1,729 units of inventory. I was able to determine this figure by analyzing our known metrics around customer demand to create a normal distribution, and then determined the percentile point function to determine what expected inventory would be needed to achieve our desired fill rate.

↩ **Reply**   👍

Victor Flores (https://classroom.emeritus.org/courses/9054/users/197659)   ⋮

Apr 10, 2024

Lysol Management Team,

As we anticipate maximum sales over the upcoming weekend, please find below a summary of the analysis conducted by the Data Analytics Team in order to estimate the inventory that needs to be ordered and the corresponding fill rate tailored to satisfy all of our customers needs around this period of time.

- The current guaranteed supply across our 12 stores is today encompassing 9500 units, the average mean at each store is 800 and the standard deviation is 250 (Source: Lysol's Historical Data - 2022-2023 and SAP Materials Management Stock Overview).

- Through advanced statistical analysis, it was observed that it will be required to store 11614 units across all stores (968 units at each store) in order to achieve a fill rate of 99%. Obtained figures were derived from applying both the percentile point and the cumulative density functions.

- As the current stock is 9,500 units, 2115 units need to be ordered to secure coverage against forecasted demand and ensure customer satisfaction.

- The fill rate of 99% will help our teams in ground to be prepared against scenarios of manufacturing defects and mobilizations delays across all our 12 stores.

Based on the above, let's take necessary actions in order to achieve our revenue objectives this month.

Regards,

Victor Flores
Data Analytics Team Lead
Edited by **Victor Flores (https://classroom.emeritus.org/courses/9054/users/197659)** on Apr 10 at 5:32pm
    Discussion 2.1 Explaining Risk Management.docx (https://classroom.emeritus.org/files/2450109/download?
download_frd=1&verifier=0xlABCpUQY6tHiQhJ5pZNVkkxoSQmtKeH9ulbyP2)

↩ **Reply**   👍   (1 like)

○

(http   **Gustavo Santana (https://classroom.emeritus.org/courses/9054/users/120927)**   ⋮
             Apr 16, 2024

             Great work Victor, I liked the source of the information being posted as well. One thing that
             would be interesting would describe other scenarios maybe with greater risk, like 80~95%
             fill rate, to give some choices for the management team to work on.

↩ **Reply** 👍

○

Chris Cosmas (*He/Him*) (https://classroom.emeritus.org/courses/9054/users/226607)   ⋮

Apr 15, 2024

In this hypothetical scenario, it is expected the stores will be receiving an estimated average demand of 900 units with a standard deviation of 200 units.

Keeping in mind all the stores are supplied by the same one location, these stores can share inventory and rely on the concept of risk pooling.

The concept of risk pooling entails that as more entities (stores) rely on one variable (shared inventory) there is less chance that all entities will have abnormal deviations (standard deviations above or below the mean) therefore lowering the need for reserves for each separate entity. This is also observed mathematically through the coefficient of variation (standard deviation / mean). As the mean and the standard deviation scale at different paces, the higher the multiple of stores the lower the variation observed is. This is due to the mean being multiplied by the scale multiple while the standard deviation's scale is square rooted. This difference in scales leads to decreasingly smaller variability.

We are assuming in this scenario that the estimated demand forms in a uniform distribution which allows us to compute the required inventory using the percentile point function through python.

Before doing so the mean and standard deviation must first be calculated:

As presented above we are estimating an average of 900 units per store with a standard deviation of 200 units. To compute the values for 12 stores we calculate the following:

- $\mu * n = 900 * 12 = 10{,}800$
- $\sigma * \sqrt{n} = 200 * \sqrt{12} \approx 200 * 3.4641 \approx 692.8203$

We compute the following code on Python with the computed values above:

```
from scipy.stats import norm
import math

std = 200
mean = 900
n_of_stores = 12
```

*mean_ttl = mean * n_of_stores*
*std_ttl = math.sqrt(n_of_stores) * std*

x = norm.ppf(0.95, loc=mean_ttl, scale=std_ttl)
print(x)

We have set a fill rate of 95% which corresponds to a Z-score that is approximately 1.645 the calculation performed will be the following:

x = μ + σ * Z

Which will give us the following output:

```
11939.588021157557
11940 - 9500 = 2440
```

We know we have 9,500 units available in the inventory which means we will need to order 2,440 additional units before the weekend.

↩ **Reply**   👍

Mhelissa Yayalar (https://classroom.emeritus.org/courses/9054/users/233590)

Apr 15, 2024

⋮

Yayalar_Try_It_2_4.ipynb - Colab.pdf
(https://classroom.emeritus.org/users/233590/files/2470713?
wrap=1&verifier=E96WbnWlGclq00DFrci7uQOHelNKB0SgU12rs2kH) ↓
(https://classroom.emeritus.org/users/233590/files/2470713/download?
verifier=E96WbnWlGclq00DFrci7uQOHelNKB0SgU12rs2kH&download_frd=1) Date: April 15, 2024

To: Management Team

From: Mhelissa Yayalar

Subject: Inventory Planning for Upcoming Weekend Sales

Dear Management Team,

As the lead data scientist, I have conducted an analysis of our inventory situation in preparation for the upcoming weekend of sales. Based on our current shared inventory across 12 stores (totaling 9,500 units), I recommend the following inventory order and fill rate strategy

to ensure meet customer satisfaction and operational efficiency during the upcoming busy weekend.

Inventory Requirement Calculation:

Demand Forecast: Based on historical sales data and customer footfall patterns during similar weekends. The projected demand for this weekend is estimated to be 11,506 with desired fill rate of 95%. This means that we aim to fulfill at least 95% of customer requests without stockouts.

Calculation Example Details:

- Guaranteed supply if all stores get 1000 units x 12 (stores)
- mean = (9500/12) * 12 (stores)
- standard deviation = 250
- Percentile point function = 11,506

Again, based on my analysis, the new demand forecast can ensure we meet customer demands and maintain efficient operations across our stores during the busy weekend.

I've attached my detailed analysis for reference. Please feel free to reach out if you need further clarification or if you would like to discuss alternative approaches.

Best regards,

Mhelissa Yayalar

Lead Data Scientist

Edited by **Mhelissa Yayalar (https://classroom.emeritus.org/courses/9054/users/233590)** on Apr 15 at 8pm

↩ **Reply**   👍

Gustavo Santana (https://classroom.emeritus.org/courses/9054/users/120927)
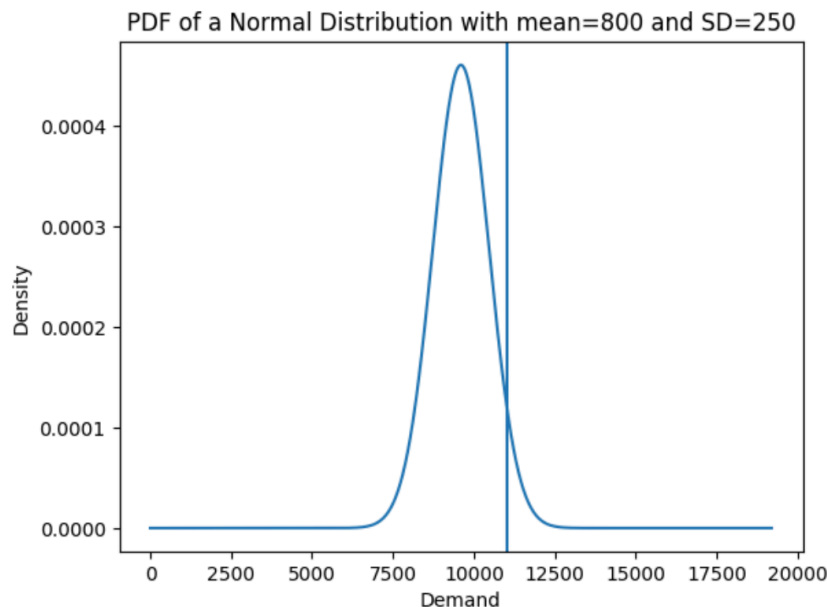
(https:/

Apr 16, 2024

⋮

Dear Mr. White,

After a careful review of the numbers for this weekend's sales, I'm concerned that the 9,500 units that we have are not enough to supply the demand, using a statistical analysis from our

past sales numbers, this amount of units will be satisfactory in only 45% of the scenarios, meaning is very likely for us to face problems with lack of units.

To be safer, I recommend increasing the unit number to 11,024, covering 95% of the cases. Here's the graph explaining the analysis, please let me know if I can provide more information.

Best,

Gustavo

↩ **Reply**   👍

○

[Isabella Tockman (https://classroom.emeritus.org/courses/9054/users/207395)](https://classroom.emeritus.org/courses/9054/users/207395)

Apr 20, 2024   ⋮

Dear Management,

I'm reaching out to discuss our inventory management strategy for the busy weekend sales across our 12 stores.

Our analysis suggests that the 9,500 units of inventory we currently have may not be sufficient to meet all customers' needs. To ensure everyone gets what they need without running out, I recommend increasing our inventory.

Based on our analysis, I propose ordering an additional 1,524 units. This will ensure that 95% of customer demand can be met with our current stock.

We arrived at this decision by analyzing past sales, seasonal trends, and anticipated demand for the weekend. By leveraging probability statistics and considering demand variability, we can make more precise predictions and optimize inventory management for efficiency.

I am confident that implementing these recommendations will enhance customer satisfaction, boost sales performance, and contribute to the success of our weekend sales initiatives.

If you have any questions or require further information, please don't hesitate to reach out.

Sincerely,

Isabella Tockman

↩ **Reply**   👍

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(https:/   **Koffi Henri Charles Koffi** (https://classroom.emeritus.org/courses/9054/users/208039)   ⋮

Apr 22, 2024

To : Team Of Inventory Management

Subject : Suggestion and recommendation for inventory fill rate

I'm writing to you to share our findings on the study for the unit required for the coming weekend to server our customer.

For the expected demand of 800 units per store ,

 with our 12 stores each store having 250 as standard deviation , the cumulative expected units will be around 866 for our 12 stores .

To satisfy our client with need a fill rate of 95% that bring us 11,024 Units for our 12 stores

Therefore the 9,500 units that we currently have won't be able to satisfy our customer need .

We recommend an additional 1524 units to be added .

↩ **Reply**   👍