Introduction

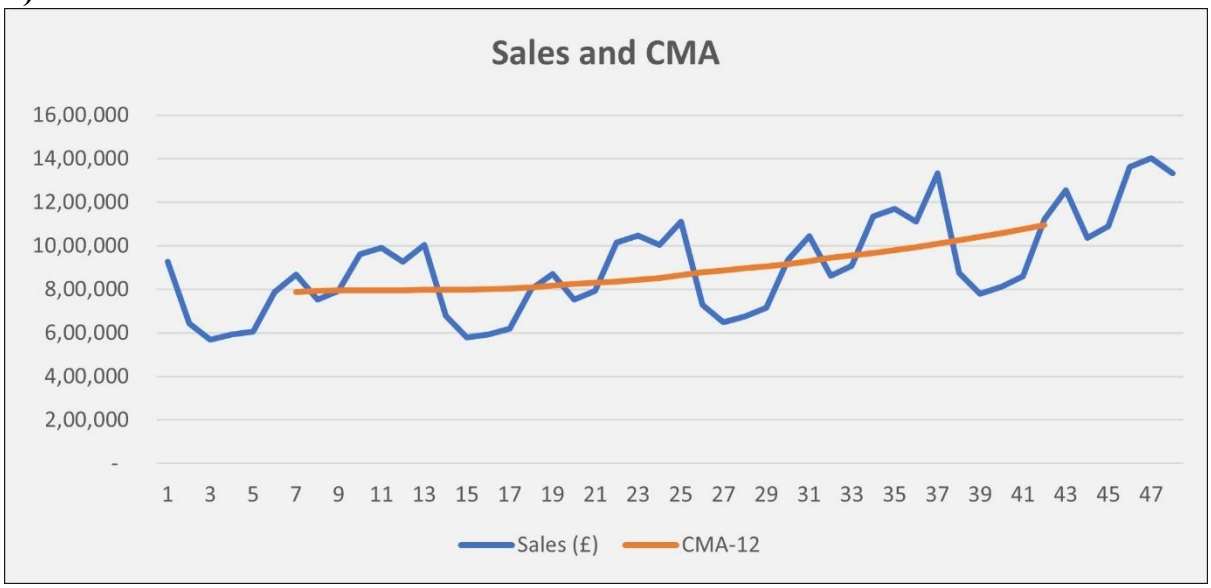
The following research seeks to provide analytical insights and strategic recommendations aimed at operational efficiency and market positioning improvements for the coming winter season for Winter Rock company. Key areas analyzed will include: cross-referencing with all past sales data, the projections of sales for the full year, strategic planning of distribution, and the full assessment of the new ski product introduction, inclusive risk assessment and supplier selection for this product line. This would involve streamlining networks so as to cut down all costs accrued from transportation and at the same time meet demands in new markets.

The analytical insights and strategic recommendations developed will be of immense help in improving the operational efficiency and market position for the coming winter season.

This involves a comprehensive review of the historical sales data, an accurate year-round sales forecast of products, and strategic distribution planning coupled with comprehensive evaluation of the new introduction of ‘Ski’ product including risk identification and supplier selection. Identify seasonal sales trends and guide capacity planning and promotional efforts accordingly. Later we will discuss the product distribution strategies keeping in mind the supply and demand measures of the suppliers. These systems are streamlined in order to meet demand and to cut down expenses associated with the transportation of products.

Section 2: Investigating Sales Trends

a)



The *"Sales and CMA"* graph compares real sales data with a 12-period centered moving average (CMA-12) to illustrate an *Additive decomposition* methodology. This model indicates a generally positive tendency in sales across the investigated time, which is important for strategic planning and analyzing long-term sales growth.

C8 =(AVERAGE(B2:B13)+AVERAGE(B3:B14))/2

	A	B	C	D	E
1	**Period**	**Sales (£)**	**CMA-12**	**Detrended Time Series**	**Year**
2	Jan-19	9,27,616			
3	Feb-19	6,42,223			
4	Mar-19	5,69,679			
5	Apr-19	5,94,002			
6	May-19	6,05,950			
7	Jun-19	7,87,416			
8	Jul-19	8,67,448	7,88,380	79,068	2019
9	Aug-19	7,53,375	7,93,033	- 39,658	2019
10	Sep-19	7,93,026	7,94,944	- 1,918	2019
11	Oct-19	9,62,370	7,95,344	1,67,026	2019
12	Nov-19	9,92,133	7,95,913	1,96,220	2019
13	Dec-19	9,27,616	7,97,020	1,30,596	2019
14	Jan-20	10,03,017	7,97,665	2,05,352	2020
15	Feb-20	6,78,494	7,97,773	- 1,19,279	2020

Calcualtion showing the centered moving average:

To take out CMA, we have to take out average of first 12 values from sales =(AVERAGE(B2:B13)) and average of next 12 values from sales '=(AVERAGE(B3:B14)) (excluding the first value from sales). Add both the averages and divide it by 2 '=(AVERAGE(B2:B13)+AVERAGE(B3:B14))/2)'.

b)

Months	2019	2020	2021	2022
January		2,05,352	2,44,503	3,22,513
February		- 1,19,279	- 1,47,862	- 1,49,955
March		- 2,18,493	- 2,37,284	- 2,60,738
April		- 2,06,013	- 2,20,781	- 2,46,271
May		- 1,84,963	- 1,89,799	- 2,16,308
June		- 9,696	18,344	25,907
July	79,068	52,402	1,15,638	
August	- 39,658	- 70,851	- 81,880	
September	- 1,918	- 36,267	- 47,934	
October	1,67,026	1,80,538	1,66,328	
November	1,96,220	2,04,499	1,89,797	
December	1,30,596	1,50,261	1,16,980	

The table, which displays monthly data from 2019 to 2022, includes high results in January and the last quarter of every year, indicating seasonal effects and suggesting possible targets for strategic planning.

D8 =B8-C8

	A	B	C	D	E
1	**Period**	**Sales (£)**	**CMA-12**	**Detrended Time Series**	**Year**
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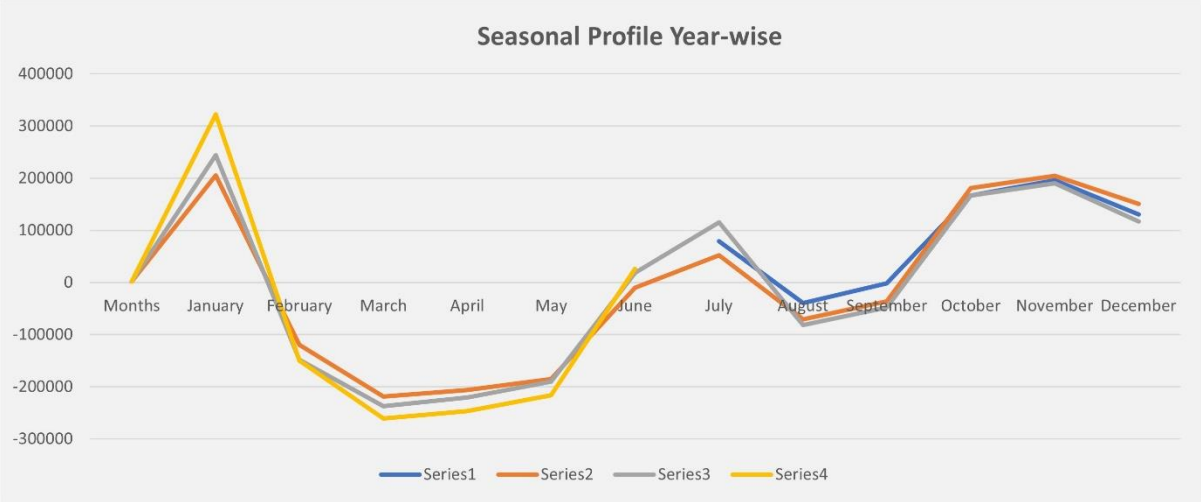
11	Oct-19	9,62,370	7,95,344	1,67,026	2019

Here i have chosen **'Additive Decomposition Approach'**. I chose this model because seasonal fluctuations are roughly consistent throughout the series—that is, when the seasonal pattern's amplitude remains constant throughout time as can be seen in the 'Sales and CMA' graph in part (a) of this section.

c)



In this chart, Series1, Series2, Series3 and Series4 represent years 2019, 2020, 2021 and 2022 respectively. Sales data from Winter Rock exhibit strong seasonal sales, which peak in January and June and decline in February and August. The necessity for strategic planning around these trends is suggested by this recurring pattern over the years.

d) Over a four-year period, the time series data shows an upward trend in sales with notable seasonal swings. Sales was at peak in January and December, indicating significant seasonal variations that are probably caused by changes in customer behavior. This trend is well-represented by the 12-month centered moving average, and the seasonal profile chart verifies that the seasonal patterns are constant from year to year. Additionally, potential anomalies,

such as sudden rises or drops, that may be impacted by outside variables or corporate objectives are shown by monthly sales data.

e) Strong January peaks and end-of-year sales increases are revealed by analyzing Winter Rock's sales trends, which implies the necessity for more operational capacity and inventories during these times. In order to balance sales, marketing should concentrate on focused promotions during these periods of high demand and take into account activities during sluggish months. Budgeting for marketing, supply chain and emergency preparation should be done in a way that best fits these seasonal patterns.

Section 3: Forecasting sales of year-round products

a)As no data prior to Jan-21 is given, I have calculated the one step ahead, taking Jan 21 as the prior data source and then calculating the forecast for the last 6 months.

b)

F55

	A	B	C	D	E	F	G	H
28	Jan-21	4,08,981				3,77,498.29		31,482.71
29	Feb-21	3,86,259				4,05,832.73		-19,573.73
30	Mar-21	3,90,309				3,88,216.37		2,092.63
31	Apr-21	4,15,962				3,90,099.74		25,862.26
32	May-21	3,79,040				4,13,375.77		-34,335.77
33	Jun-21	3,75,104				3,82,473.58		-7,369.58
34	Jul-21	3,88,840				3,75,840.96		12,999.04
35	Aug-21	3,56,962				3,87,540.10		-30,578.10
36	Sep-21	3,63,273				3,60,019.81		3,253.19
37	Oct-21	3,57,854				3,62,947.68		-5,093.68
38	Nov-21	3,67,430				3,58,363.37		9,066.63
39	Dec-21	3,79,770				3,66,523.34		13,246.66
40	Jan-22	3,69,900				3,78,445.33		-8,545.33
41	Feb-22	3,71,455				3,70,754.53		700.47
42	Mar-22	3,88,846				3,71,384.95		17,461.05
43	Apr-22	3,82,643				3,87,099.90		-4,456.90
44	May-22	3,89,195				3,83,088.69		6,106.31
45	Jun-22	3,71,134				3,88,584.37		-17,450.37
46	Jul-22			3,66,794		3,72,879.04		-6,085.04
47	Aug-22			3,68,392		3,67,402.50		989.50
48	Sep-22			3,96,193		3,68,293.05		27,899.95
49	Oct-22			3,74,006		3,93,403.01		-19,397.01
50	Nov-22			4,19,541		3,75,945.70		43,595.30
51	Dec-22			4,28,280		4,15,181.47		13,098.53

The sales data for the period of July to December 2022 indicates a rise in sales, which peaks in September and then rises once more towards the end of the year, indicating seasonal demand. Time series modeling is used in these projections to project sales trends.

c) Here I have taken the alpha value as *'0.3'*. I have chosen this alpha value because by using apha value as 0.3, the error value reduces drastically. For the purpose of computing Average

Mean Error, 0.3 error value may be selected in order to reduce the influence of outliers and weight errors, or to be in line with particular operational or budgetary goals.

d)

Summary error Measures(in-sample)	
ME	-1,272.49
MAE	17259.91535
MAPE	4%
MSE	57,95,07,096.65
RMSE	24072.95363

The forecast's *mean error (ME)* is *-1272.5*. Given the possibility for forecast inaccuracy, the *mean absolute error (MAE)* of 17259.91 indicates that typical deviations are fairly high. Significant diversity in mistakes is highlighted by the exceptionally high *mean squared error (MSE)* of 57,95,07,096.65 suggesting significant differences between actual and predicted values. These indicators collectively imply that the model might require improvements to improve accuracy.

e)

Summary Error Measures(out-sample)	
ME	13,001.07
MAE	21082.06072
MAPE	5%
MSE	64,75,83,540.74
RMSE	25447.66278

With a *mean error (ME)* of 13,001.07, the out-of-sample forecast consistently exaggerates. A high *mean squared error (MSE)* of 64,75,83,540.74 and a *mean absolute error (MAE)* of 21,082.06 both point to significant variation in forecast errors and big average deviations. These indicators suggest that the model might have difficulty making accurate and reliable forecasts when using data that isn't tested. **(Anesthesiol, 2015)**

f)

Summary error Measures(in-sample)	
ME	-1,272.49
MAE	17259.91535
MAPE	4%
MSE	57,95,07,096.65
RMSE	24072.95363
Summary Error Measures(out-sample)	
ME	13,001.07
MAE	21082.06072
MAPE	5%
MSE	64,75,83,540.74
RMSE	25447.66278

The forecasting model overestimates (10,016.87 ME) out-of-sample data and underestimates in-sample data (-576.26 ME). Large mistakes are shown by high MAE and MSE values, which are indicative of poor model fit and accuracy of prediction. Significant deviations from expectations are validated by RMSE.

Section 4: Distribution Plan

a)
We can represent this obstacle as a *transportation problem in a linear program* and find the best shipping plan for Winter Rock to meet regional demand while minimizing distribution expenses. To meet demand at the lowest feasible shipping cost, the overall decision entails figuring out exactly how many things each distribution center *(London and Manchester)* should ship to each region *(East Midlands, West Midlands, Northwest)*.

Decision Variables:

Let's define the decision variables for this problem:

yME: Number of items shipped from Manchester to the East Midlands.
yMW: Number of items shipped from Manchester to the West Midlands.
yMN: Number of items shipped from Manchester to the Northwest.
yLE: Number of items shipped from London to the East Midlands.
yLW: Number of items shipped from London to the West Midlands.
yLN: Number of items shipped from London to the Northwest.

Objective:

The objective is to *minimize the total shipping cost*, which can be expressed as:

Minimize Z = 15yME + 21yMW + 17yMN + 23.5yLE + 25.5yLW + 22yLN

Constraints:

Supply Constraints:

Total items shipped from Manchester cannot exceed its capacity:
yME + yMW + yMN ≤ **2500**

Total items shipped from London cannot exceed its capacity:
yLE + yLW + yLN ≤ **3000**

Demand Constraints:

Total items received by the East Midlands must meet its demand:
yME + yLE = **2000**

Total items received by the West Midlands must meet its demand:
yMW + yLW = **930**

Total items received by the Northwest must meet its demand:
yMN + yLN = **2200**

Defining the issue

This transportation problem can therefore easily be built up in any linear programming tool or software like an Excel solver once the decision variables, objectives, and constraints of the problem are formulated. This would be useful in deciding the optimum values of yME, yMW, yMN, yLE, yLW, and LN that could maintain all the restrictions of demand and supply and at the same time ensure minimized overall costs. That, in turn, ensures that Winter Rock efficiently allocates resources at minimized costs.

b) Objective

With that in mind, the distribution strategy of Winter Rock will be to distribute items from both the company's distribution centres, located at Manchester and London, with the aim of serving the demands located in East Midlands, West Midlands, and Northwest, in such a way as to minimize the total shipping cost.

Objective Function

We develop an objective function summing the total costs incurred in shipping goods from each distribution center to the regions. This will be done by multiplying the number of goods that get transported in each route, with the cost of transportation for each of the items.

Thus, the objective function is formulated as:

Minimize Z = 15yME+21yMW+7yMN+23.5yLE+25.5yLW+22yLN

Here, Z represents the total cost to be minimized. The goal of this linear programming model is to find the values of zyME, yMW, yMN, yLE, yLW and yLN that satisfy all supply and demand limitations and yield the lowest overall transportation cost achievable. Reducing distribution costs is the main goal that this objective function directly addresses in order to improve supply chain efficiency and improve logistics.

f) Let's examine the solver's results and compile the best distribution plan's overall cost:

Optimal Distribution Plan:

From Manchester to East Midlands (Xem): 2000 units

From Manchester to West Midlands (Xwm): 0 units

From Manchester to Northwest (Xnm): 500 units

From London to East Midlands (Xel): 0 units

From London to West Midlands (Xwl): 930 units

From London to Northwest (Xnl): 1700 units

Total Distribution Cost:

Based on the solver's computation, this optimal plan has a total cost of ***£99,615***.

Examining the Distribution Plan:

Capacity Utilization:

Manchester has used:

2000 + 0 + 500 = 2500
2000 +0 + 500 = 2500 units of its 2500 capacity.

London has used:

0 + 930 + 1700 = 2630
0+930+1700=2630 units of its 3000 capacity.

Demand Satisfaction:

East Midlands:
2000 ($Manchester$) + 0 ($London$) = 2000
2000 (Manchester) + 0 (London) = 2000 units

West Midlands: 0 ($Manchester$)+930 ($London$) = 930
0 (Manchester) + 930 (London) = 930 units

Northwest:
500 ($Manchester$) + 1700 ($London$) = 2200
500 (Manchester) +1700 (London)=2200 units

This approach exploits the capacity of both Manchester and London to the fullest extent possible, meeting demand in every region precisely as needed.

Justification for Total Cost:

The transportation rates that are applied to the amount of goods that are transported from each distribution center to each area determine the total cost. The £99,615 computed cost represents the lowest cost that can be achieved given the limitations and distribution rates.

Section 5: Meeting new product demand

a) I constructed a decision tree to examine Winter Rock's choice to source skis from the USA or Europe depending on the degree of demand uncertainty.

Parameters from the Scenario:

Selling Price per Ski: £150

Demand Scenarios:
High Demand: 1000 skis
Low Demand: 500 skis

Europe Supplier:

Capacity: 500 skis
Minimum Charge: £0

Unit Costs: Labour £60, Material £40, Shipping £20 (Total £120 per ski)

USA Supplier:

Capacity: 1000 skis
Minimum Charge: £5000

Unit Costs: Labour £30, Material £40, Shipping £30 (Total £100 per ski)

Calculating Expected Profits:

Profit Calculation:

Profit = Revenue – Cost − Minimum Charge

Where:

Revenue = Quantity Sold × Selling Price

Cost = Quantity Sold × Unit Cost

Europe Supplier:

High Demand (1000 skis):

Only 500 can be supplied.

Revenue = £150 × 500 = £75,000

Cost = £120 × 500 = £60,000

Profit = £75,000 - £60,000 = **£15,000**

Low Demand (500 skis):

Revenue = £150 × 500 = £75,000

Cost = £120 × 500 = £60,000

Profit = £75,000 - £60,000 = **£15,000**

USA Supplier:

High Demand (1000 skis):

Revenue = £150 × 1000 = £150,000

Cost = £100 × 1000 = £100,000

Minimum Charge = £5,000

Profit = £150,000 - £100,000 - £5,000 = **£45,000**

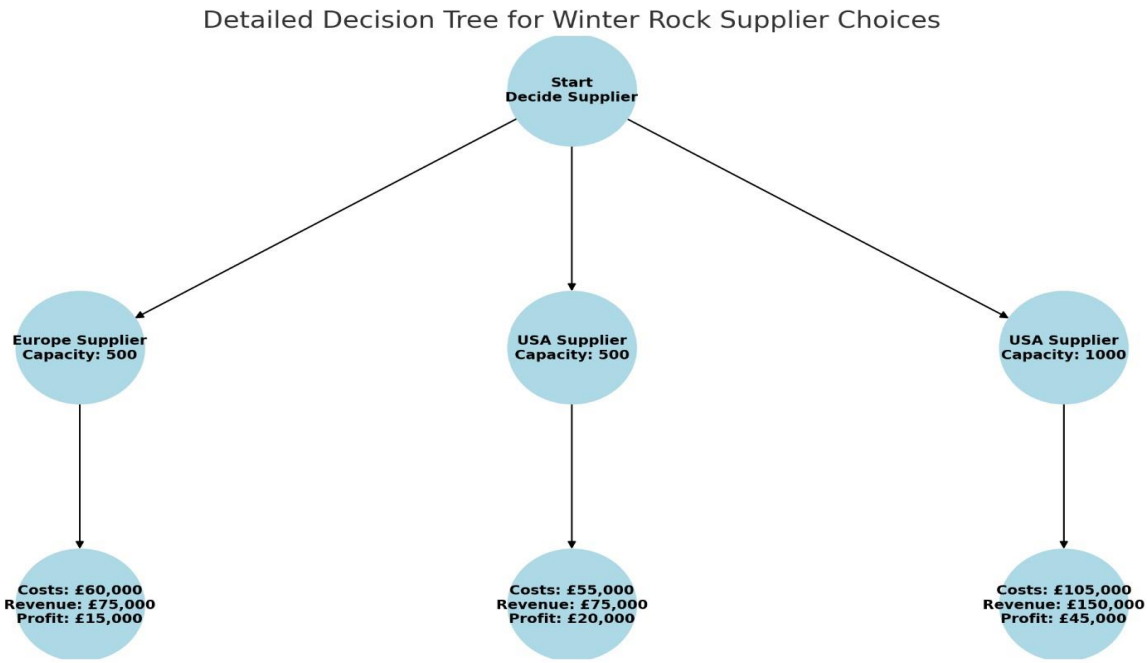
Low Demand (500 skis):

Revenue = £150 × 500 = £75,000

Cost = £100 × 500 = £50,000

Minimum Charge = £5,000

Profit = £75,000 - £50,000 - £5,000 = **£20,000**



According to the **decision tree**, sourcing from Europe yields a profit that is consistent at £15,000(left stem of decision tee) regardless of demand, whereas sourcing from the USA offers a higher potential profit of £45,000(right stem of decision tree) in scenarios with high demand but also necessitates a larger upfront commitment of £5,000, which results in profit of £20,000(middle stem of decision tree) in scenarios with low demand.

b) Maximin Rule:

Considering the calculations:

By adopting the maximin rule, Winter Rock guarantees a less profitable but safer route while minimizing possible losses. The sole profit outcome for Europe Supplier is £15,000. In case of limited demand, the minimal profit for the USA Supplier is £20,000. The maximin criteria states that Winter Rock should select the USA supplier since their minimal profit of £20,000 is higher than that of the European supplier's minimum profit of £15,000. **(Clifton, 1983)**

Pros and Cons of Maximin Rule

Pros:

Demand Flexibility Satisfaction: The US supplier will, therefore, be in a position to allow an order of up to 1000 skis in case there is unpredictable hiking of demand.

Cons:

Danger of Overpaying for Capacity: If a minimum fee is set(5000) and the demand isn't close to 1000 skiers, there's a chance that you'll pay too much for products that isn't even used.

c) Maximax Rule:

Overall, the maximax rule does not take into consideration the probability of falling short of the high demand forecasts, even though it is consistent with a risk-seeking strategy that aims for the maximum possible rewards.

Under the High Demand scenario, the USA supplier offers the MaxMax Potential profit of £45,000. Thus, Winter Rock should select the USA Supplier in anticipation of a large demand for 1000 skis if they stick to the maximax decision rule. **(Akhtari, 2019)**

Pros and Cons of Maximax Rule:

Pros:

Maximized Profit: Thus, venturing into Winter Rock can make sure that the profit is maximized in case the high-demand scenario really ensues.

Scalability: The supplier from the USA will be able to meet the increased demand, hence Winter Rock can increase sales in case the market demand responds well.

Cons:

Over-reliance on High Demand: Whenever actual sales are less than the level of demanded high quantity, then this will affect profitability, which may lead to the burdening of finances since there is unsold inventory and high expenditures put into manufacturing.

d) Expect Profit

The USA supplier is a more favorable option for a business looking to maximize expect profits because they can accommodate both high and low demand situations with a greater total expected profit. **(Sepulveda, 2020)**

Calculation of Expected Profit:

European Supplier:

Can only fulfill orders up to 500 skis.

Profit for Low Demand (500 skis): £15,000

Profit for High Demand: Not applicable (cannot meet demand).

Expected Profit = 0.5 * £15,000 + 0.5 * £0 = **£7,500**

USA Supplier:

Can fulfill up to 1000 skis.

Profit for High Demand (1000 skis): £45,000

Profit for Low Demand (500 skis): £20,000

Expected Profit = 0.5 * £45,000 + 0.5 * £20,000 = **£32,500**

The Pros and Cons of Expect Profit:

Pros:

Flexibility in Supply: Winter Rock has greater options when it comes to inventory and sales tactics because the USA supplier can manage situations with both high and low demand.

Cons:

Danger of Overcommitment: If the demand tends to be more at the lower side of the range most of the time, it iss a risk to overcommit with the US supplier due to high leftover inventory.

e) Comparison between Suggestions:

Risk and Return: The maximax approach would fit in high-risk and high-return if perfect conditions emerged. The maximin technique is basically conservative and attaches higher regard to stability and the reduction of possible losses. Expected profit, more balanced than the other two, would involve a more sophisticated approach.

Demand Sensitivity: Expect Profit takes the average of the other two rules. On the other hand, the Maximin pre-supposes the worst and does take into consideration the possibility of low demand. This approach takes into account fluctuations in markets.

Market Readiness: Where Maximin would suggest a safe stance, perfect for low demand markets, MaxiMax would suggest nothing less than high confidence in the market with very ambitious growth tactics. Expect Profit method shows a low level of confidence to estimate the demand of the market.

Winter Rock's Final Decision-Making Considerations:

Analysis of Market Demand: In-depth demand forecasting is of significance. Winter Rock would have to assess consumer behavior and market conditions.

Risk management: Financial stability has to be assessed. Can Winter Rock take the risk of unsold inventory and fixed expenses of the minimum charge imposed by the USA supplier?

Strategic Objectives: Match your supplier selection to your long-term corporate objectives. Is Winter Rock trying to stabilize their position (risk-averse) or trying to break into the market (risk-seeking)?

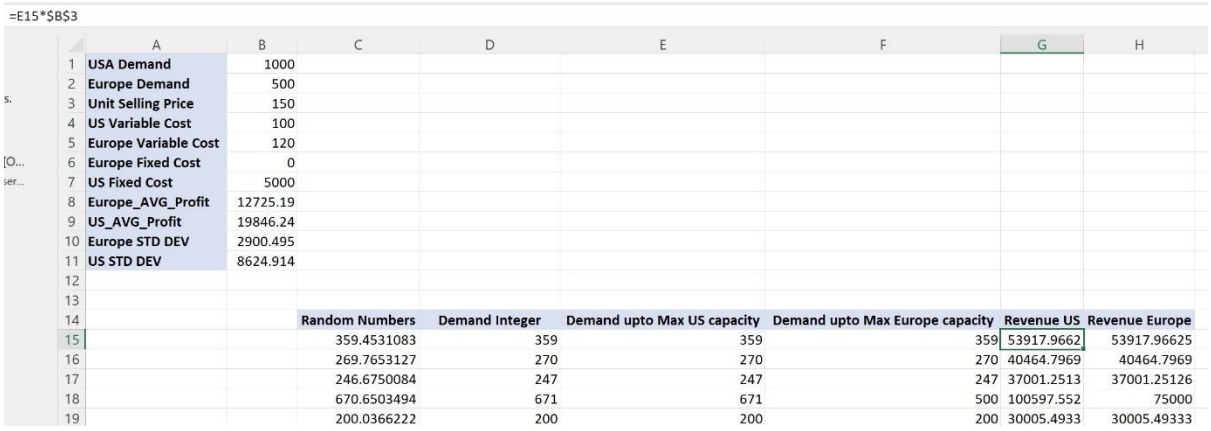
Winter Rock can use this information to finalize their supplier strategy in such a way that at the same time, it minimizes risks and maximizes possible rewards in a judicious manner, leveraging information gained from both these assessments and the larger context of their company. On the other side, once the skis actually hit the market, this decision must be adjustable enough to allow customer input and changed behavior.

Section 6: The impact of meeting new product demand

a) I have used Random Data Generation under Data Analysis function to create random numbers under the column **'Random Numbers'**. In the next row I converted these decimal numbers into whole numbers under the column **'Demand Interger'**.

Random Numbers	Demand Integer	Demand upto Max US capacity	Demand upto Max Europe capacity	Revenue US	Revenue Europe
359.4531083	359	359	359	53917.9662	53917.96625
269.7653127	270	270	270	40464.7969	40464.7969
246.6750084	247	247	247	37001.2513	37001.25126
670.6503494	671	671	500	100597.552	75000
200.0366222	200	200	200	30005.4933	30005.49333
512.039552	512	512	500	76805.9328	75000
463.4418775	463	463	463	69516.2816	69516.28162
683.1568346	683	683	500	102473.525	75000
294.082461	294	294	294	44112.3692	44112.36915
675.2830592	675	675	500	101292.459	75000
316.7882321	317	317	317	47518.2348	47518.23481
455.8427686	456	456	456	68376.4153	68376.4153
691.3418989	691	691	500	103701.285	75000
596.5636158	597	597	500	89484.5424	75000
636.9762261	637	637	500	95546.4339	75000
374.1752373	374	374	374	56126.2856	56126.28559
307.1565905	307	307	307	46073.4886	46073.48857
614.3803217	614	614	500	92157.0482	75000
454.3778802	454	454	454	68156.682	68156.68203

b) To calculate the associated revenue, I multiplied 'Demand upto Max US Capacity' and 'Demand upto Max Europe Capacity' by 'Unit Selling Price'. This gave me revenue for both US and Europe stated under columns 'Revenue US' and 'Revenue Europe'.



c) As mentioned the associated fixed cost with for Europe is 0, but for US its 5000. This cost for US is the fixed charge that US suppliers charge before manufacturing of the product irrespective of the intensity of the demand.

	A	B
1	**USA Demand**	1000
2	**Europe Demand**	500
3	**Unit Selling Price**	150
4	**US Variable Cost**	100
5	**Europe Variable Cost**	120
6	**Europe Fixed Cost**	0
7	**US Fixed Cost**	5000
8	**Europe_AVG_Profit**	12725.19
9	**US_AVG_Profit**	19846.24
10	**Europe STD DEV**	2900.495
11	**US STD DEV**	8624.914

d) From the provided information, while taking into account 'Labour', 'Material' and 'Shipping'. Total variable cost for US amounts to 100 whereas total variable cost for Europe amounts to 120.

Variable Cost Calculation		
	US	**Europe**
Labour	30	60
Material	40	40
Shipping	30	20
Total	100	120

f) The formula to calculate profit here is:

Profit = Revenue-Cost

Revenue Europe	Europe_Fix_Cost	US_Fix_Cost	Europe_Variable_Cost	US_Variable_Cost	Europe_Production_Cost	US_Production_Cost	Europe_Profit	US_Profit
53917.96625	0	5000	120	100	43134.373	40945.31083	10783.59325	12972.65542
40464.7969	0	5000	120	100	32371.83752	31976.53127	8092.95938	8488.265633
37001.25126	0	5000	120	100	29601.00101	29667.50084	7400.250252	7333.75042
75000	0	5000	120	100	60000	72065.03494	15000	28532.51747
30005.49333	0	5000	120	100	24004.39467	25003.66222	6001.098666	5001.831111

For example to calculate Europe_Profit, we subtract Europe_Production_Cost from Revenue Europe.

g) As seen in the image below, the average profit is calculated by taking average of all the profits of the random 1000 samples. The formula used is '=AVERAGE(P15:P1014)'. To calculate standard deviation, I used the formula, '=STDEV(Q15:Q1014)'.

=AVERAGE(P15:P1014)

	A	B
1	**USA Demand**	1000
2	**Europe Demand**	500
3	**Unit Selling Price**	150
4	**US Variable Cost**	100
5	**Europe Variable Cost**	120
6	**Europe Fixed Cost**	0
7	**US Fixed Cost**	5000
8	**Europe_AVG_Profit**	12725.19
9	**US_AVG_Profit**	19846.24
10	**Europe STD DEV**	2900.495
11	**US STD DEV**	8624.914

h) We'll concentrate on the importance and possible business consequences of the measures provided

1. Average Europe Profit: $12,725.19

AVERAGE US Profit: $19,846.24

The US operations are, on average, more profitable per unit than what the operations would have been in Europe. It may indicate a number of strategic advantages or operational efficiency, including higher pricing power of the US and efficient cost management.

2. Europe's Standard Deviation: $2,900.495
US Standard Deviation: $8,624.914

The standard deviation of the US is much higher, meaning that profits may be higher but equally much more unpredictable. The stability of profit for Europe can be displayed by a lower standard deviation across the whole continent, for example. This stability may do good things for predictable financial planning and risk management.

3. Understanding Operations

US's capacity to fulfill demand is twice that of Europe (1000 units vs. 500 units)

4. Strategic Business Decisions

Investment Decisions: The company may think of spending more there so as to gain from better profit margins prevalent in the US market. In Europe, all efforts should be towards cutting variable costs if the market will allow. **(Lackman, 2000)**

Consequences of Section 5 Results on Section 6

The Winter Rock Company must consider the following best supplier strategy with the help of Maximax, Maximin, and Expect Profit rules. Each rule provides a different point of view on risks and potential rewards:

Maximin Rule: The solution would be to go with the USA supplier, as it could supply 1000, and the guaranteed profit margin is higher than that of other suppliers at £45,000.

Maximax Rule: As per this method this firm will choose the alternative that will give the largest possible profit, irrespective of risk. Again, the USA supplier, offering 1000 units, comes out top, as he has possible profits amounting to £45,000.

Expect Profit Rule: It decides the average weighed value of all possible earnings by weighing each possibility depending on its probability. With 1000 capacity and equal probability of outcomes, the USA provider has the largest predicted profit at £45,000.

Therefore, Winter Rock should take from the USA supplier, who has a capacity of 1000 units, based on all three criteria. This source appears to be clearly preferred over all other possible sources, in all possible market conditions, and all risk considerations based on the indication of highest minimum and maximum profits, and best predicted profit. This is a strategy that effectively balances between profit maximization and risk management, fitting in both aggressive and cautious corporate plans.

Conclusion and Recommendations

Strategic assessment by Winter Rock demonstrates the use of data-driven insights that are very important to improve the position in the market and operational efficiency. Review of sales patterns indicated a further upward trend with the most pronounced seasonal highs in January and December, further emphasizing the need for effective inventory control during such periods of high demand. Estimates of year-round product sales showed an increase as well, but the substantial error rates indicated the need for further development of forecasting models in order to raise accuracy and dependability.

Thanks to the linear programming model, it became possible to optimize the distribution strategy and reduce transportation costs against existing transport tariffs without compromising the full capacity operations of the Manchester and London distribution centers. From the decision tree analysis, the ski product's supplier would be that from the USA, which has high production capacity. This gives potential for better earnings, even as it maintains its variable profit margins. Financial analyses found that while US suppliers make more profits than those in Europe. This implies, therefore, that better profit margins are to be found but with less consistency indicated by standard deviation.

I would recommend that the introduction of the new ski product with the USA supplier be optimally utilized to harness more potential earnings, retaining the distribution that is optimized to maintain the cost efficiency and competitiveness.

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