

COVER PAGE

BUSINESS NAME: QBUS3330

PROJECT NAME: ASSIGNMENT 2

WORD COUNT: 1,648

DIVIDED INTO 2 SECTIONS

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SECTION1.0-Monte Carlo Simulation

This Excel model predicts the first year of operations for a bubble tea store in Haymarket by simulating annual sales figures as well as costs and profits through the application of @Risk for Monte Carlo simulations. This methodology accounts for fluctuations in demand and expenses to improve the accuracy of forecasts.

1.1-Description

Inputs:

Model Inputs							
Variable	Distribution	Distribution parameter					
Demand(unit sales)	Normal	peak season	9000	off peak	6000	coefficient of variation	30%
Selling price and product mix	Constant	Long Jing Green	5.5	5.00%			
		High Mountain Oolong	6	7.50%			
		Yunnan Black	5.5	7.50%			
		Jasmine Green	5.5	10.00%			
		Assam Black Milk	6.5	25.00%			
		Brown Sugar Latte	6.5	10.00%			
		Matcha Latte	8	12.50%			
		Peach Tea	8	15.00%			
		Lychee Tea	6	5.00%			
		Guava Tea	7.5	2.50%			
Variable costs	triangular	min	mode	max			
		28%	30%	35%			
fixed costs	constant	store build and eq	rent	salaries	utilities	others	
		30,000.00	62,400.00	240,900.00	12,000.00	15,000.00	

Demand Parameters: To adjust for variations, the average monthly demand and standard deviation are incorporated into a truncated normal distribution to prevent negative values from occurring.

Product Mix: Proportional market shares for each tea type are set from historical data and market analysis.

Selling Prices: Unit prices for each tea type are set to facilitate revenue calculations.

Cost Parameters: Variable expenses are estimated using a triangular distribution (min, mode,max)which accounts for fluctuations in prices; whereas fixed expenses such as rental and salaries remain stable over time.

Outputs:

Model outputs			
Variables	Values		
Market demand	90041.68129		
total revenue	598777.1805		
total variable costs	185620.926		
Total fixed costs	360,300	Total costs	545,921
Net Profit	52,856		

Market Demand (annual sales) for Teas: The model calculates total potential monthly and annual bubble tea sales in Haymarket by applying product mix percentages to simulated monthly demand, summing monthly units sold per tea type to derive annual demand totals.

7												=RiskNormal(B31,B32,RiskTruncate(0,))*\$F\$4											
A		B		C		D		E		F		G		H		I		J		K			
demand simulation setup																							
Month		jan		feb		march		april		may		june		july		august		sep		oct			
peak/offpeak Demand		9000				9000		9000		6000		6000		6000		6000				9000			
SD for demand		2700				2700		2700		1800		1800		1800		1800				1800			
Normal		9004.17		9004.168129				9004.168129		6002.778752		6002.778752		6002.779		6002.778752		6002.779		6002.778752			
Product mix to monthly demand																							
Month		jan		feb		march		april		may		june		july		august		sep		oct			
Long jing green		450.208		450.2084064		450.2084064		300.1389376		300.1389376		300.1389		300.1389376		300.1389		300.1389376		450.208			
High mountain oolong		675.313		675.3126096		675.3126096		450.2084064		450.2084064		450.2084		450.2084064		450.2084		450.2084064		675.312			
Yunnan black		675.313		675.3126096		675.3126096		450.2084064		450.2084064		450.2084		450.2084064		450.2084		450.2084064		675.312			
Jasmine Green		900.417		900.4168129		900.4168129		600.2778752		600.2778752		600.2779		600.2778752		600.2779		600.2778752		900.416			
Assam Black Milk		2251.04		2251.042032		2251.042032		1500.694688		1500.694688		1500.695		1500.694688		1500.695		1500.694688		2251.04			
Brown sugar Latte		900.417		900.4168129		900.4168129		600.2778752		600.2778752		600.2779		600.2778752		600.2779		600.2778752		900.416			
Matcha latte		1125.52		1125.521016		1125.521016		750.347344		750.347344		750.3473		750.347344		750.3473		750.347344		1125.52			
Peach Tea		1350.63		1350.625219		1350.625219		900.4168129		900.4168129		900.4168		900.4168129		900.4168		900.4168129		1350.62			
Lychee tea		450.208		450.2084064		450.2084064		300.1389376		300.1389376		300.1389		300.1389376		300.1389		300.1389376		450.208			
Guava tea		225.104		225.1042032		225.1042032		150.0694688		150.0694688		150.0695		150.0694688		150.0695		150.0694688		225.104			
total units sold																							

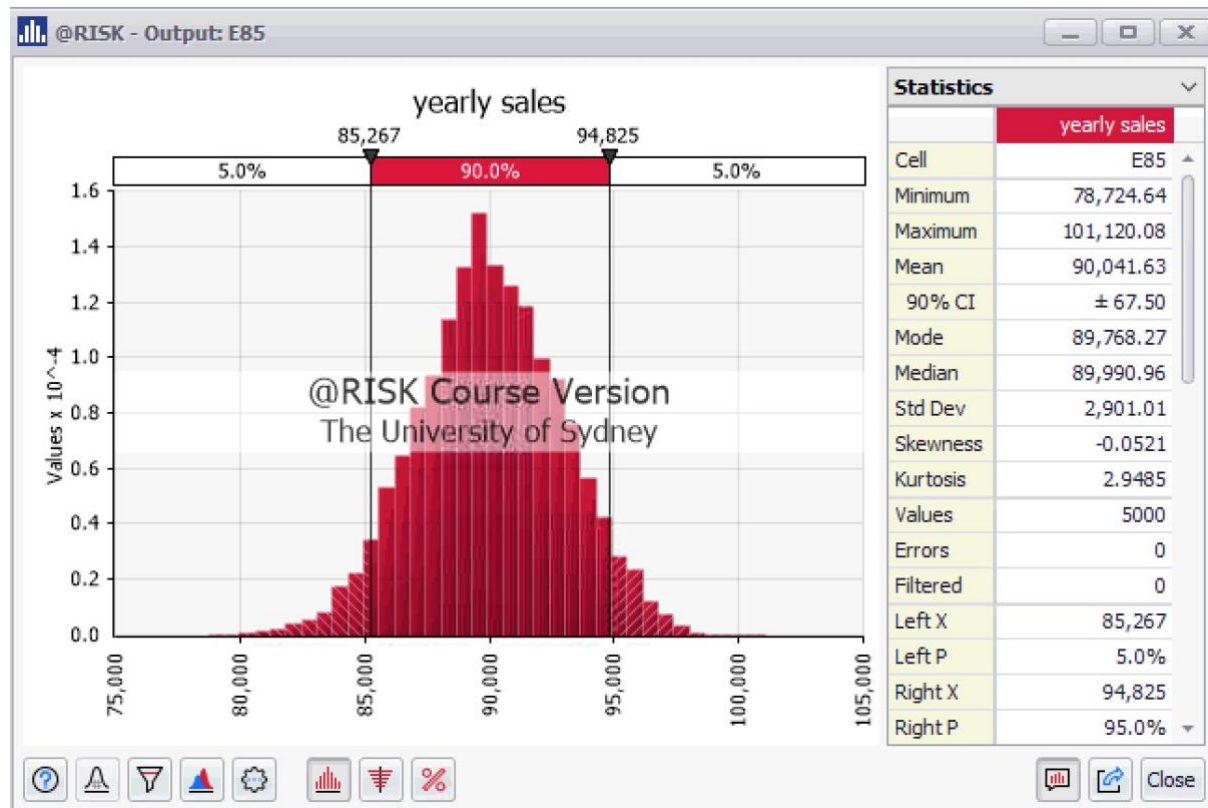
Revenue and Costs: To calculate the revenue, the number of units sold for each type of tea is multiplied by its price annually. Variable expenses are determined by multiplying the cost percentage (represented by a triangular distribution model) with the revenue. A truncated normal distribution is used to simulate demand and adjust for seasonal changes.

B50										
=RiskTriang(\$E\$17, \$E\$18, \$E\$19)*E4										
	A	B	C	D	E	F	G	H	I	J
0	Jasmine Green	900.417	900.4168129	900.4168129	600.2778752	600.2778752	600.2779	600.2778752	600.2779	60
1	Assam Black Milk	2251.04	2251.042032	2251.042032	1500.694688	1500.694688	1500.695	1500.694688	1500.695	15
2	Brown sugar Latte	900.417	900.4168129	900.4168129	600.2778752	600.2778752	600.2779	600.2778752	600.2779	60
3	Matcha latte	1125.52	1125.521016	1125.521016	750.347344	750.347344	750.3473	750.347344	750.3473	7
4	Peach Tea	1350.63	1350.625219	1350.625219	900.4168129	900.4168129	900.4168	900.4168129	900.4168	90
5	Lychee tea	450.208	450.2084064	450.2084064	300.1389376	300.1389376	300.1389	300.1389376	300.1389	30
6	Guava tea	225.104	225.1042032	225.1042032	150.0694688	150.0694688	150.0695	150.0694688	150.0695	15
7	total units sold									
8	Variable costs	0.31								
9			total variable cost	Total revenue	Total fixed costs	profit				
0	Long jing green	1.705	7676.05333	24761.46235	30,000					
1	High mountain oolong	1.86	12560.81454	40518.75658	62,400					
2	Yunnan black	1.705	11514.07999	37142.19353	240,900					
3	Jasmine Green	1.705	15352.10666	49522.92471	12,000					
4	Assam Black Milk	2.015	45358.49695	146317.7321	15,000					
5	Brown sugar Latte	2.015	18143.39878	58527.09284						
6	Matcha latte	2.48	27912.9212	90041.68129						
7	Peach Tea	2.48	33495.50544	108050.0175						
8	Lychee tea	1.86	8373.87636	27012.50439						
9	Guava tea	2.325	5233.672725	16882.81524						
0	Total		185620.926	598777.1805	360,300	52,856.25				

Total Costs and Profit: Summed variable and fixed costs (summation of given fixed costs) to compute total costs. Profit/loss is computed as the difference between total revenue and total costs.

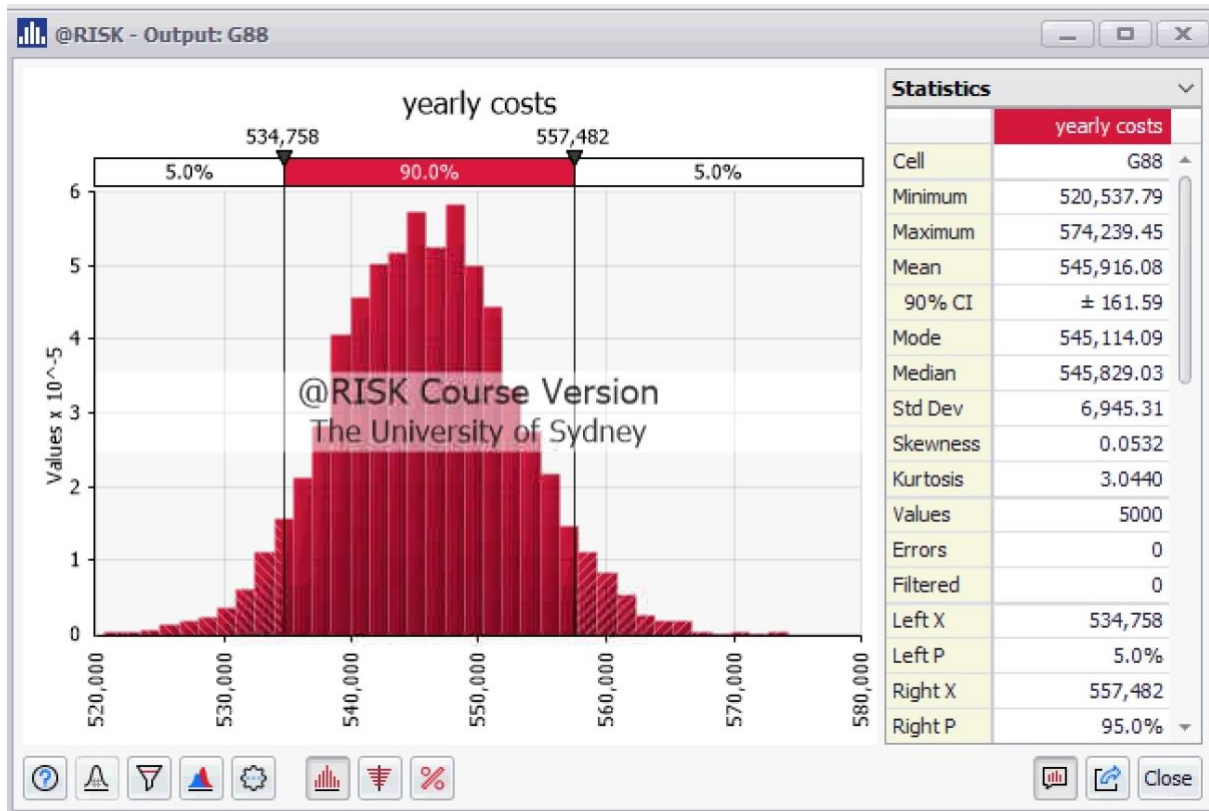
1.2-Model results

The simulation tool @Risk provides distributions of sales figures and expenses as well as overall profits, crucial for assessing the financial sustainability of the bubble tea store.



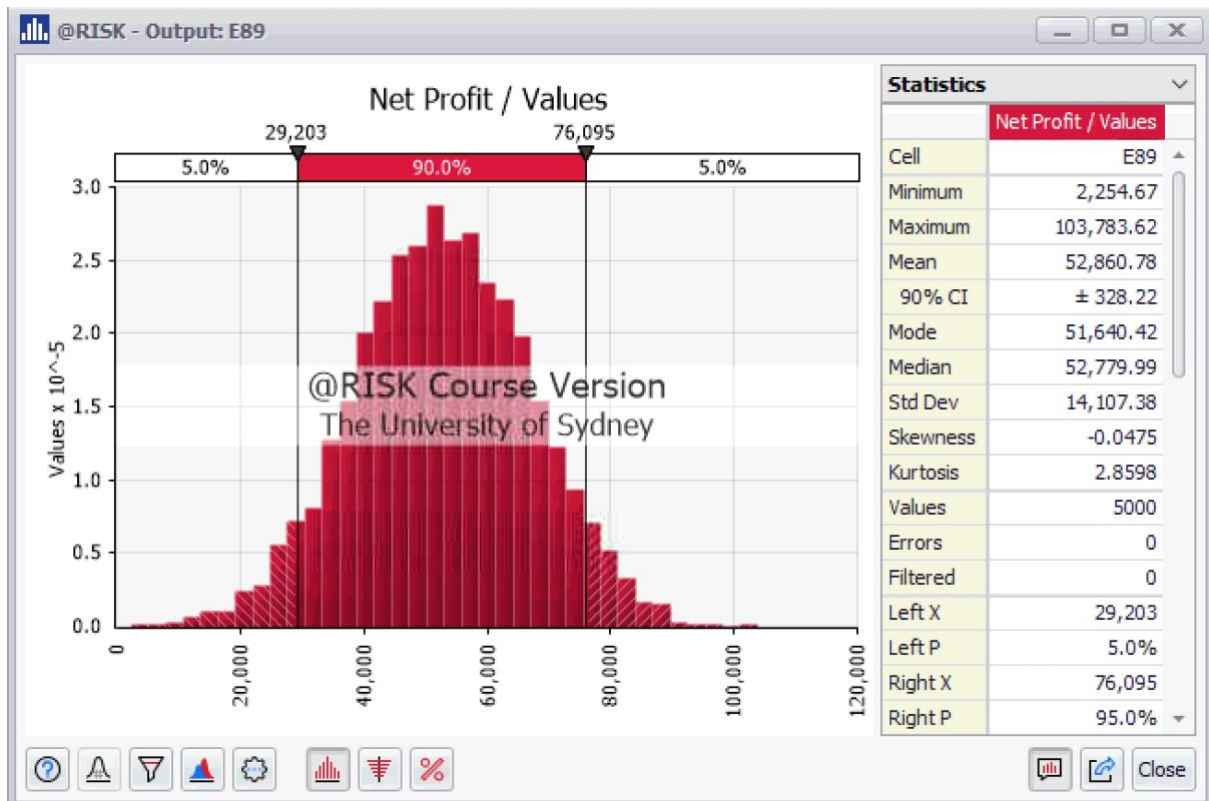
Yearly Sales:

The average annual sales amount to \$90,041.63 with a 90% confidence interval, between \$85,267 and \$94,825. Showing a stable market demand but highlighting the importance of marketing tactics to reach higher sales goals.



Total Costs:

On a basis the yearly costs remain steady at an average of \$545,916.08 and range between \$520, 537 and \$574, 239, which indicates control over costs while also showing that a substantial portion of expenses are fixed.



Net Profit:

The average net profit distribution stands at about \$52,860.78. Which Can vary widely between \$2,254 to \$103,783. This shows a risk of low profitability but also a promising potential for higher earnings, by increasing sales volumes and managing costs effectively.

Business Implications:

Profit-Margin: On average earning a profit of 10.36% against revenue, which is common in the food service industry sector. However, the variable outcomes highlight the importance of risk management that prioritizes controlling costs and boosting sales.

Strategic Actions: Adjusting pricing tactics to mirror customer value and cost breakdown is vital for business' success. The introduction of loyalty initiatives and tiered pricing models can attract customers and encourage repeat purchases. Applying management techniques can streamline operations reducing inefficiencies and boosting profitability.

Loss-risk: There's a 5% probability that profits might hover near \$2,254.67, close to a break-even scenario, highlighting the need for effective strategic planning and market analysis.

Mitigation Strategies: Improving customer engagement through targeted marketing efforts and broadening sales avenues such as online ordering and delivery partnerships is vital in the business realm today, along with, regularly analysing market and competitors, for changing customer preference adaptation.

Investment Decision: Investors should consider profit variability when assessing the risk-return profile. Diversifying marketing efforts and exploring cost reduction strategies are pivotal.

Innovation: Diversifying the product line with seasonal or limited-time items can capture niche markets and reduce reliance on traditional sales. Investing in technologies like automated kiosks or enhanced CRM systems can boost efficiency and customer satisfaction.

Financial Safeguards: Establishing a financial buffer to handle downturns and maintaining a flexible business model for quick market adjustments will mitigate risks from profit variability.

1.3-Decision

According to @risk simulations, It is suggested to consider launching a bubble tea store, in Haymarket, indicating an average yearly profit of \$52,860 with potential earnings between \$2,254 to \$103,783. It is noted, that this decision involves risk but falls within the typical profit margin of approximately 10.36 percent, for retail food businesses.

The fluctuations in earnings highlight the significance of management—especially when shareholders play a role in day-to-day activities like overseeing inventory control and customer interactions as well as marketing initiatives—all of which can greatly enhance operational effectiveness and customer contentment to propel the business towards exceeding profit projections. Such proactive engagement streamlines operations, minimizes costs, Promotes involvement, all aspects in a fiercely competitive marketplace.

Moreover, having investors actively engage enables faster adaptations to business strategies, boosting the stores potential for profit in the first year. Considering these dynamics, launching the store is seen as a worthwhile venture, especially when dedicated investor oversight is in place to optimize projected earnings and reduce uncertainties linked to profit fluctuations.

SECTION2.0-Lockdown-Impact

2.1.1-modifications

Model Inputs							
Variable	Distribution	Distribution parameter					
Demand(unit sales)	Normal	peak season	9000	off peak	6000	coefficient of variation	30%
Selling price	Constant	Long Jing Green	5.5				
		High Mountain Oolong	6				
		Yunnan Black	5.5				
		Jasmine Green	5.5				
		Assam Black Milk	6.5				
		Brown Sugar Latte	6.5				
		Matcha Latte	8				
		Peach Tea	8				
		Lychee Tea	6				
		Guava Tea	7.5				
Variable costs	triangular	min	mode	max			
		28%	30%	35%			
fixed costs	constant	store build and eq	rent	salaries	utilities	others	
		30,000.00	62,400.00	240,900.00	12,000.00	15,000.00	
lockdown occurrence	binary	5%					
demand reduction	Factor	50%	applies only if lockdown				

To assess lockdown impacts the model now includes a "Lockdown occurrence" input with a 5% monthly chance, reducing demand by 50% during lockdowns using the following formula for each month's binary distribution.

[illegible]

Demand Adjustment: Introduced a "Lockdown Setup" row. During a lockdown, the normal demand for each tea type is cut 50%. The formula used is:

$$=IF(\text{LockdownCell}=1, \text{RiskNormal}(\text{BaseDemand} * 0.5, \text{BaseSD} * 0.5, \text{RiskTruncate}(0)), \text{RiskNormal}(\text{BaseDemand}, \text{BaseSD}, \text{RiskTruncate}(0)))$$

Example for January:

possibility of financial losses in harsh conditions while an optimistic scenario could yield profits surpassing \$72,151.

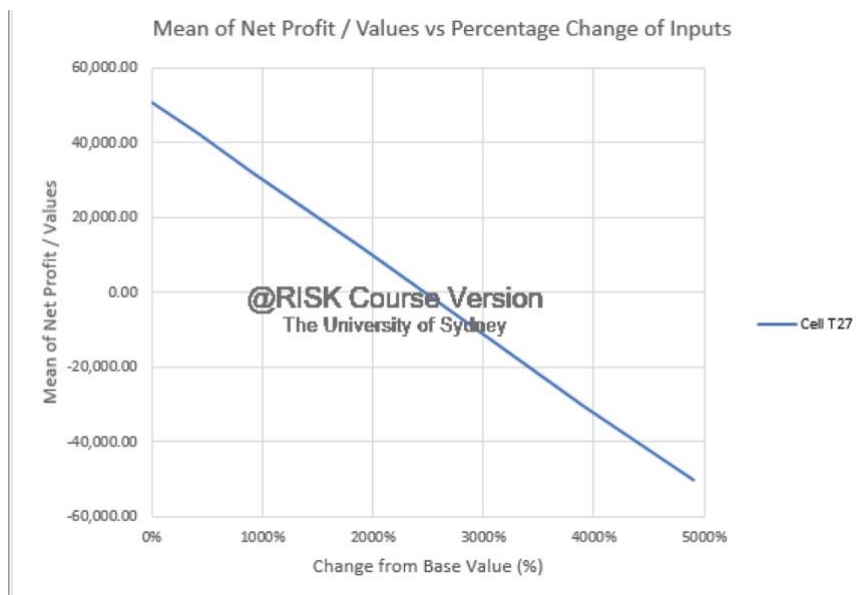
The fluctuation, in profits requires risk management plans to be in place for businesses to navigate uncertainties successfully during times like lockdowns when foot traffic is limited or reduced online sales occur as a result of it. Businesses may need to focus more on boosting online sales, cutting costs or diversifying their product mixes to adapt and thrive in such situations based on statistical data. Skewness and kurtosis patterns that show an asymmetrical profit distribution with a tendency towards scenarios with lower profits than higher ones which indicates that while high profits are possible they are less likely compared to scenarios, with lower profits or moderate losses

2.1.3-impact on decision

Considering the chance of a lockdown, which introduces significant volatility and potential losses to the profit distribution, reassessing the initial decision is prudent. The wide range in profit outcomes, with a real possibility of incurring losses, highlights the need for robust contingency planning. While the business may remain profitable on average, the financial risk during lockdowns is non-trivial. This necessitates enhanced strategic measures such as diversifying sales channels or optimizing cost structures to safeguard against the higher financial risks introduced by lockdown scenarios. Therefore, the initial decision to proceed might now warrant a more cautious approach, with a strong focus on implementing risk mitigation strategies before fully committing to the venture. Hence, I would revise the initial decision from Part 1.3. Given the conservative, risk-averse approach.

2.2-Sensitivity analysis

2.2.1-insights

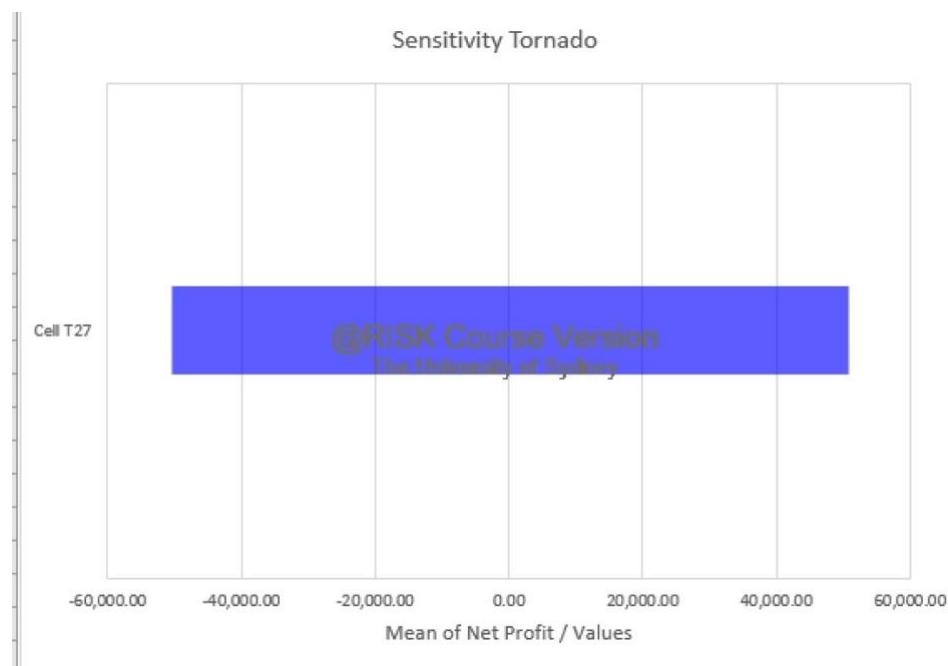


Cell T27	
% Change	Mean
0	50,877.43
4	42,577.37
9	32,326.21
19	11,936.64
29	-8,919.72
39	-30,253.60
49	-50,331.62

Profit Sensitivity: As the chances of lockdowns rise higher, so does the decline in profit, significantly from around \$50,877.43 without any lockdown restrictions to roughly -\$50,331.62 at a 50 percent chance of lockdowns happening which shows a clear link between heightened probabilities of lockdowns and lower profitability levels.

Risk Exposure: Changes in lockdown likelihood can significantly impact performance as profit outcomes can go from gains to significant losses when the chances of lockdown increase from 1% to 50%. This highlights the importance of having risk management plans in place.

The accompanying line graph visually illustrates the significant decline in net profit as lockdown probabilities increase.



Risk Management: The sensitivity highlights the need for robust risk management strategies to quickly adapt to changing lockdown conditions, potentially by diversifying sales strategies or enhancing online services.

Investment Decisions: For investors, particularly those less risk-averse, this analysis is crucial for evaluating the trade-off between high returns and significant risks.

Strategic Planning: Businesses should consider flexible operational strategies that can adjust based on the lockdown situation to minimize losses during higher probability periods.

2.2.2-decision

Yes, the evaluation impacts my decision about starting the store. The analysis shows that the net profit is quite sensitive to variations in lockdown probabilities. As the likelihood of lockdowns rises there is a risk of facing financial setbacks. Considering my conservative risk profile, the increased financial risks linked with chances of lockdown make proceeding with opening the shop less appealing. This highlights the necessity for plans and adaptable operational strategies to manage these risks effectively before moving forward with the business endeavour.

2.3-free delivery

2.3.1-modification

Model Inputs							
Variable	Distribution	Distribution parameter					
Demand(unit sales)	Normal	peak season	9000	off peak	6000	coefficient of variation	30%
Selling price	Constant	Long Jing Green	5.5				
		High Mountain Oolong	6				
		Yunnan Black	5.5				
		Jasmine Green	5.5				
		Assam Black Milk	6.5				
		Brown Sugar Latte	6.5				
		Matcha Latte	8				
		Peach Tea	8				
		Lychee Tea	6				
		Guava Tea	7.5				
Variable costs	triangular	min	mode	max			
		28%	30%	35%			
fixed costs	constant	store build and eq	rent	salaries	utilities	others	
		30,000.00	62,400.00	240,900.00	12,000.00	15,000.00	
lockdown occurrence	binary	5%					
demand reduction	Factor	50%	applies only if lockdown				
online sales	Uniform	50%	80%				
Delivery costs	Normal	\$4	std	\$1.20			

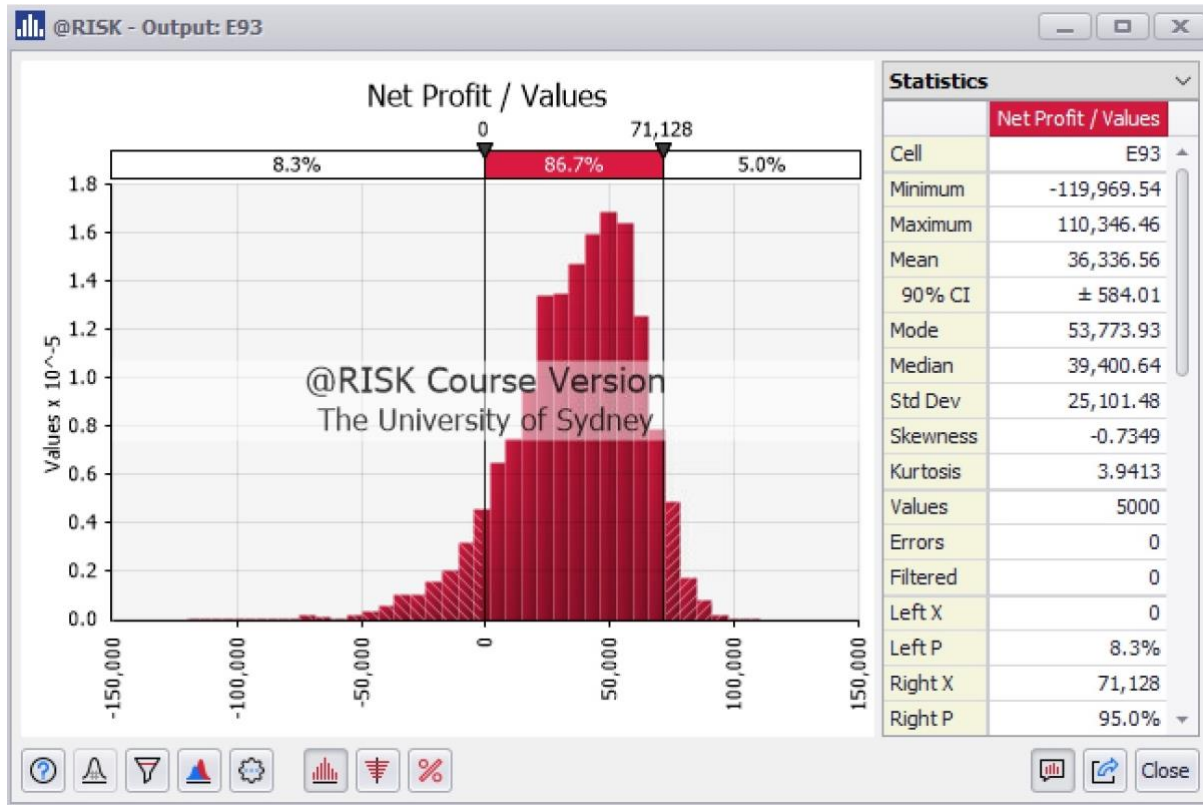
Model outputs		
Variables	Values	
Market demand	85539.59722	
total revenue	568838.3215	
total variable costs	176339.8797	
Total fixed costs	360,300	Total costs
Delivery costs	11705.41857	
Net Profit	20,493	

During lockdowns period, the calculations for sales income and delivery costs were integrated into the model. The share of online sales varied between 50% to 80% distributed uniformly with average delivery expenses following a normal distribution with an average of \$4 and a standard deviation of \$1.20(simulated dynamically). monthly revenue figures changed with the increase in online sales and delivery costs were factored to overall expenses. When free deliveries were prevalent, delivery costs were deducted from earnings.

=IF(S32=1, B33*\$T\$25, 0)									
S	T	U	V	W	X	Y	Z	AA	
Online sales	0.65								
Delivery costs	4								
lockdown probability	0.05								
lockdown setup									
lockdown_jan	lockdown_feb	lockdown_march	lockdown_apr	lockdown_may	lockdown_june	lockdown_july	lockdown_aug	lockdown_sep	lockdown_oct
0	0	0	0	0	0	0	0	0	0
proportion of online sales									
Jan	Feb	March	April	May	June	July	August	september	October
0	0	0	0	0	0	0	0	0	0
delivery costs									
Jan	Feb	March	april	May	June	July	August	September	October
0	0	0	0	0	0	0	0	0	0

Used this formula to calculate the proportion of online sales where B33 is the total revenue(units) for Jan. and to get the delivery costs, simply multiplied “=RiskNormal(4, 1.2)” with their corresponding online sale proportion if there is lockdown.

2.3.2-profit-impact



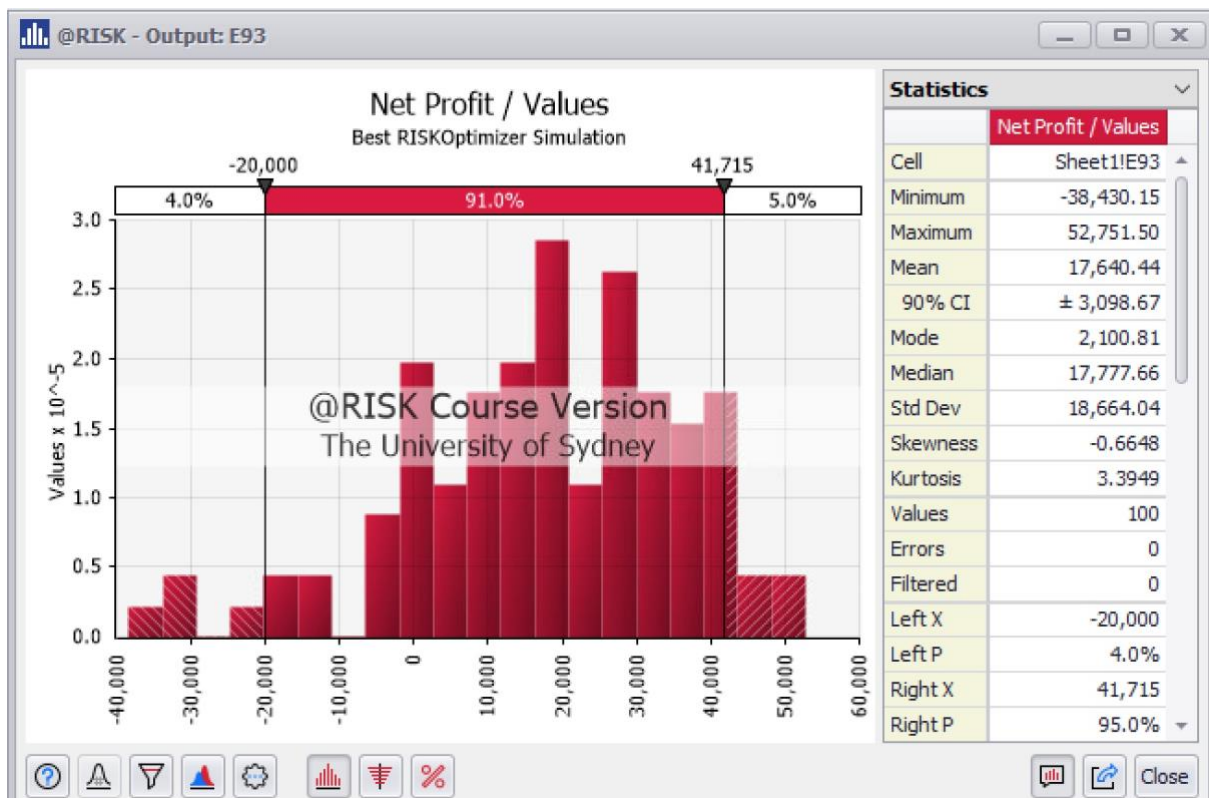
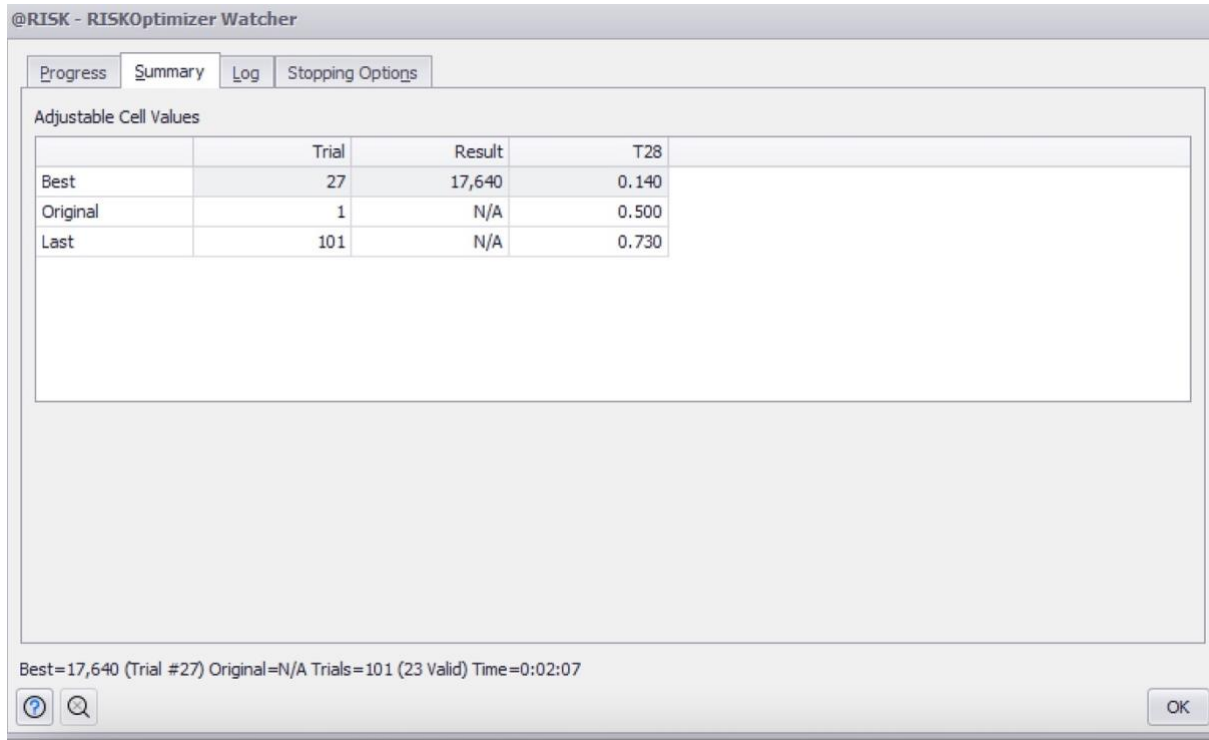
The results from @Risk indicate that free deliveries during a lockdown leads to an increase in net profit volatility, ranging from a loss of \$119,969.54 to a gain of \$110,346.46, Highlighting high financial risk involvement. Average net profit stands at \$36,336.56 with an 8.3% chance of losses. This wide range emphasizes the consequences of covering delivery expenses. Although it boosts sales, it also introduces financial uncertainty. The negative skewness (-0.7349) along with kurtosis (3.9413) suggests that while extreme losses are infrequent their effects are considerable.

2.3.3-Decision

Providing free deliveries during lockdowns may boost customer loyalty and sales numbers; however, the financial uncertainties outlined in the @Risk report call for caution. The possibility of losses and a rise in profit fluctuations should be thoughtfully evaluated. It could be wiser to split shipping expenses with customers or look into subsidized delivery offers instead. This strategy might strike a balance, between enticing customers, Ensuring financial oversight and Reducing risks while improving service appeal amid lockdowns.

2.4-Risk optimizer

2.4.1-delivery cost coverage



covered delivery costs	0.14
optimizer	0

By utilizing the Risk Optimizer tool effectively, it was discovered that covering up to 14% of the delivery costs ensures a small 5% chance of experiencing losses exceeding \$20,000. The optimization model fine-tuned the coverage percentage for delivery costs to reduce the risk of losses while still maintaining a satisfactory level of

profitability. The analysis showed that it is best to cover around 14 percent of delivery expenses to balance risk and potential earnings efficiently by ensuring a chance of making a profit while limiting losses within manageable limits. This approach effectively handles the risks linked with disruptions caused by lockdowns.

2.4.2-offering attractiveness

charging a delivery fee that partially covers the cost yet remains appealing to customers is key. During lockdown periods, where 50% to 80% of sales are expected to be online, it becomes crucial to balance the delivery cost coverage to maintain service attractiveness. The analysis showed that covering 14% of delivery costs optimally balances risk and profit potential. As observed in 2.1, lockdown introduces significant losses and to mitigate those we need to enhance customer appeal and share the cost burden during high online sales periods, charging a delivery fee that covers about 35%-50% of the actual costs could be effective. This approach ensures the business does not bear the full brunt of delivery expenses, making the service more sustainable, while still maintaining the allure of affordability and convenience for the customer. This balance also caters to the increased dependency on delivery services during lockdowns, making it a financially sound yet customer-friendly strategy.