Report on TomMac strategic decisions.

LPMS consulting

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Overview

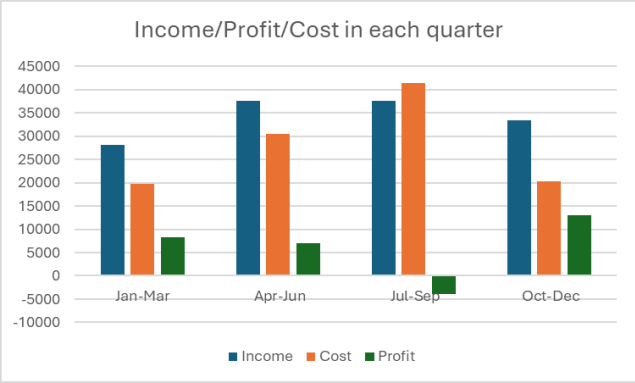
First, we modelled the current conditions for the TomMac Company to investigate the current decisions that should be made regarding resource purchasing and usage as well as product manufacturing, sale and storage in the interest of maximising annual profit. We have then modelled the predicted future situation, consisting of; a sale price increase of 20% for each product and a 5% increase in production costs. Using this model, we evaluated the optimal combination of the new options available (renting a new warehouse, signing a new contract and purchasing new machinery) to maximise annual profit. For this optimal arrangement, the possibility for increased profits by allowing a 0.02 variation in the current fixed mix properties has then been investigated. Each of the models were constructed using the Xpress program. The details regarding the models are found within the supplied Mosel file.

Results

The optimal policy for the company is to buy the maximum amount of moneymaker tomatoes in each quarter, and Appendix A details the optimal purchasing strategy for the rest of the varieties. From buying these amounts of tomatoes, the amounts of each product that TomMac is able to make is detailed in Appendix B. The amounts of canned products made in each quarter equals the demand. If the company also holds the following amounts of each product in stock at the end of each period, then the amounts of each product that TomMac would be able to sell (based on the contract and demand) is outlined in Appendix C.

Stock	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Juice	0	0	0	0
Sauce	0	0	1410	108
Paste	0	90	3590	1633
Canned	0	0	0	0

From this, the income, profit and costs in each quarter will be as follows: TomMac would make a loss of £3900 in the 3rd quarter but would recoup this loss in the 4th quarter. Overall TomMac will incur a total cost of £112,000, and a total income of £136,500, resulting in a yearly profit of £24,500. If you prefer not to make a loss in any quarter, then the new total profit would be reduced to £23980, and you would then be making £0 profit in Q3 (detail in accompanying Mosel file). We will continue assuming you do make a loss in Q3 for the purposes of this report.



To see how many of each tomato variety should be used to make each product in order to achieve the maximum profit, see Appendix D.

Sensitivity analysis of the solution

Firstly, for the tomato varieties, all beef tomatoes are used up in Q1 and Q4. If more beef tomatoes became available in these quarters, the revenue would increase by £0.60 and £0.48 respectively per extra kg of beef tomatoes (profits minus any cost of getting these extra tomatoes). All moneymaker tomatoes are used in all quarters. If more moneymaker tomatoes became available, then the revenue would increase by £0.33, £0.02, £0.16 and £0.26 for each respective quarter per extra kg of moneymaker tomatoes. Plum tomatoes are never fully used up, so there would be no reason to try to obtain more. The warehouse is completely filled at the end of Q3, and if more space were available to rent, then the revenue would increase by £0.76 per kg. Clearly, without knowing the costs of any of these steps we cannot advise whether they would be profitable overall, but they are definitely worth looking into. It would be unwise to break any contracts as this would reduce profits (the amounts made for juice in Q1, sauce in Q1, Sauce in Q4 and paste in Q1 match the contract, and breaking the contract would reduce profits by £0.09, £0.19, £0.09 and £0.10 respectively per kg). Paste production is limited by production capacity in Q3, if TomMac were able to outsource paste production in this quarter, then the revenue would increase by £0.30 per extra kg of paste. In the cases where the manufacture of certain products is limited by demands, if the demands were able to be increased (perhaps by an advertising campaign), then the amounts that the profits would increase by for each product in each quarter is outlined in Appendix E.

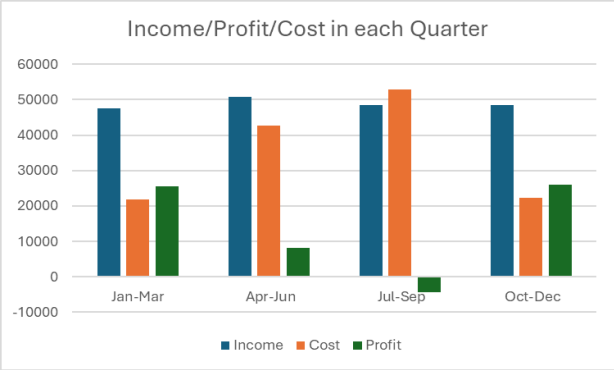
Additional strategic decisions

TomMac has several theories about the future which we used to inform what their next steps should be. They forecast that the prices of their products (for contracts and additional sales) will increase by 20%, and the demand for them will remain constant. They also predict that production costs will increase, although by a much smaller 5%. It is on the basis of these assumptions that we determined which, if any, steps TomMac should take to maximise future profits. Furthermore, TomMac has three strategic decisions to make, **(1) whether to rent another warehouse (with capacity 5000 kg at a cost of £3000 per year)**; **(2) whether to sign an additional contract** (contract details available in Appendix F); **(3) whether to upgrade the machinery (to increase production by 20% at a cost of £400 per year)**. Our findings for how these decisions will affect profit are below:

Decision combination	Profit (£)
New base	48325
Warehouse	49937
Contract	Infeasible
Production	48317
Warehouse + Contract	52020

Warehouse + Production	49849
Contract + Production	Infeasible
All decisions	**52035**

Clearly, the optimal decision would be to sign the new contract, rent the new warehouse and upgrade the machinery, resulting in a new profit of £52035. Note that without the new warehouse, TomMac would be unable to fulfil the new contract. Taking all decisions, the new yearly income will be £195,192, with a cost of £143,157, meaning a profit of £52,035. Looking at the quarterly view, TomMac would still be making a loss in Q3 – if you did not want to make a loss in any quarter, then the profit would reduce to £51220, and you would make £0 profit in Q3. For the purpose of this report, we will continue assuming you make a loss in Q3. All tomatoes are completely used up except for plum tomatoes in Q3 (see Appendix G, and to see how many of each tomato is used for each product, see Appendix K). If more tomatoes became available, then the revenue would increase as follows (minus any extra cost for the extra tomatoes):



(£/kg)	Q1	Q2	Q3	Q4
Beef	3.47	2.28	2.65	3.32
Plum	0.57	0.02	-	0.45
Moneymaker	1.27	1.18	1.33	1.25

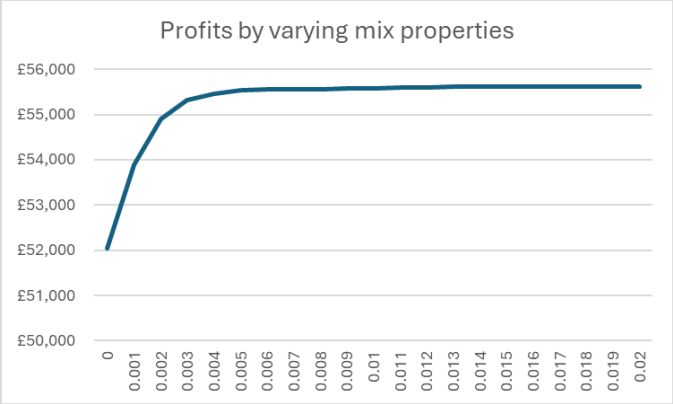
The amount TomMac should be willing to pay to make profit, must be less than the one specified, as long as the quantity acquired does not exceed constraints, such as production limit and warehouse space. If more tomatoes became available, beef tomatoes should be prioritised as they increase the revenue the most. As in the base case, the warehouse is not used in Q1, and filled at the end of Q3 (see Appendix I), and if any extra space were available to rent, then the profits would increase by £0.71 per kg (minus any extra cost of renting the extra space). The optimal strategy for making and selling products are outlined in Appendix H and Appendix J respectively, there we can see how the strategy is similar to the base case – with more paste and juice being produced in Q3 to ultimately be stored in the warehouse. Like the base case, the manufacture of paste is limited in Q3 by production capacity. The value of increasing production capacity is £0.28/kg. Manufacture of canned product meets the demand in Q2, Q3 and Q4. The value of increasing demand for canned products is £0.74, £0.91 and £0.10 (per kg) respectively. All other products are produced to meet both contracts, but no more than that, and the values for breaking the contracts are as follows:

£/kg	Q1	Q2	Q3	Q4
Juice	-1.72	-0.70	-0.80	-1.62
Sauce	-1.66	-0.72	-0.76	-1.58
Paste	-1.01		-0.10	-0.91

Clearly, it would not be wise to break the contracts as this would reduce profits.

Varying mix properties

If the product mix properties were able to vary within a 0.02 (2%) tolerance, then using the optimal decision set above (i.e. taking all decisions), the profits will be increased as follows: if the mix properties were to vary by 0.01, the maximum profit would be £55,584; and if the mix properties were to vary by 0.02, then the maximum profit would be £55,620. Clearly, the more the mix properties are varied, the less the profit increases (diminishing return), so if there is an extra cost to varying the mix (potentially the demand will decrease based on the new formulation – we are told that having the correct ratios in the mix is essential for product quality), then it would not make sense to vary the mix properties by as much as 0.02. Potentially 0.005 (0.5%) would be adequate to increase profits by £3424.77 (+6.58%), while keeping an almost identical formulation.

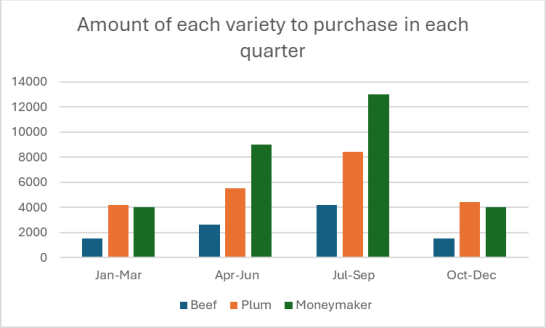


Ideas for Further Investigations

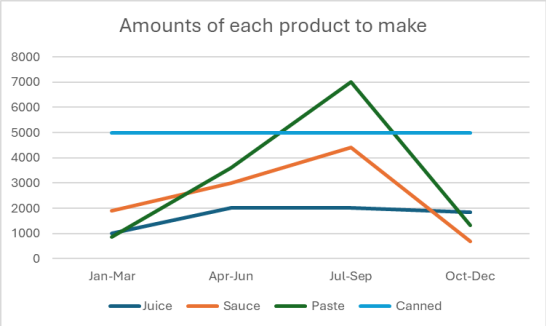
Clearly the steps detailed in our report are not the only way that TomMac could increase their profits moving forwards. As TomMac grows, we assume that they will implement many of the suggestions we have made. Based on this assumption, there is a good chance they will increase their purchases of tomatoes to the point where this is no longer a limiting factor on sales (perhaps taking out a contract with a tomato farm). At this point we will be back in the situation mentioned in the sensitivity analysis of the solution section, where advertising campaigns to increase demands for products could help to boost profits. There are many different ways to advertise (social media, television, billboards, etc.) and all of these methods have different prices and different levels of effectiveness. We could carry out an investigation on the most cost-effective way for TomMac to raise the demand for their products. In a situation where TomMac has access to sufficient supplies of tomatoes, they may also want to consider launching another product, for instance tomato ketchup. If TomMac worked out the composition ratios and the costs of any additional ingredients required to make this, and secured potential buyers for it, then we could analyse the costs and revenues to determine whether this would be profitable. Finally, we would be able to assist with any further questions similar to those already addressed in the report. If, for instance, TomMac is offered some alternative/additional contracts to the ones they currently have, or if another warehouse becomes available for them to rent, we would be able to advise on the profitability of taking those steps, or any other similar ones.

Appendix

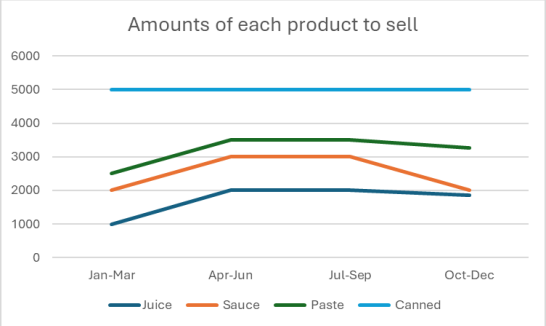
A – Base case tomato purchase strategy



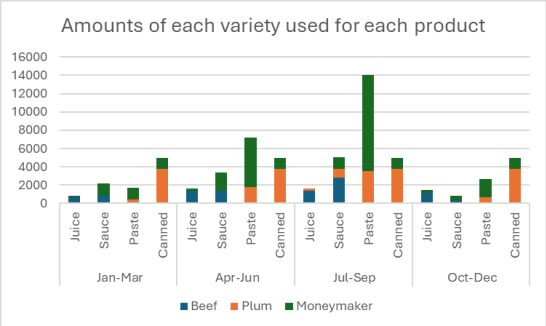
B – Base case product making strategy



C – Base case product selling strategy



D – Base case amounts of each variety used for each product



E – Base case value for increasing demand

Extra profits (per kg of extra product) if demand for each product were to be increased in each quarter, "-" means that the manufacture of that product in that quarter did not meet the initial demand.

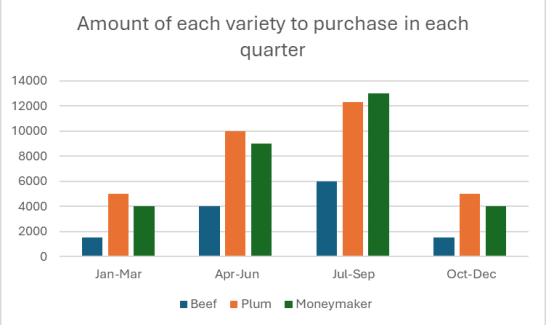
	Q1	Q2	Q3	Q4
Juice	-	£0.58	£0.72	-
Sauce	-	£0.63	£0.77	-
Paste	-	£0.96	£0.86	-
Canned	£0.26	£0.63	£0.80	£0.28

F – New contract

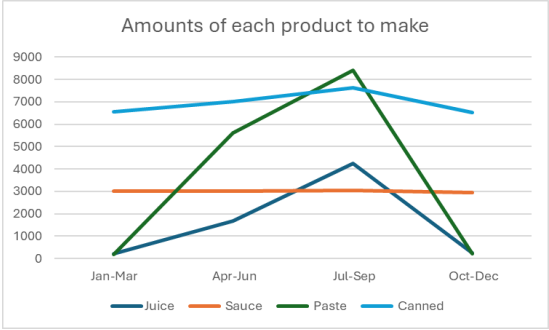
New contract (without 20% increase in price):

	New contract sales			
	Juice	Sauce	Paste	Canned
New contract (kg)	600	1000	1000	2000
New contract price (£/kg)	1.93	2.66	4.35	2.05

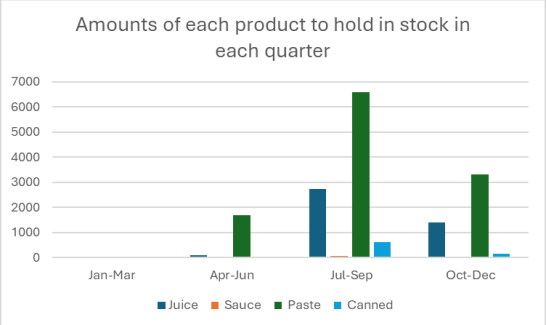
G – New case tomato purchase strategy



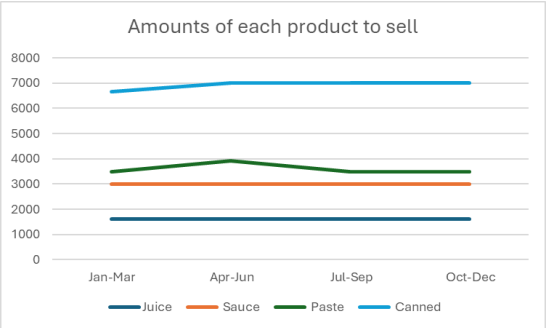
H – New case product production strategy



I – New case product stock strategy



J – New case product selling strategy



K – New case amounts of each variety used for each product