Report to the managing director of GNK Manufacturing Limited (GNK).
Profit maximisation analysis; comparing the benefits and disadvantages of outsourcing.

Executive Summary

- Given GNK constraint (machine hours) GNK should allocate its limited resources based on contribution margin in ascending order. DS3 has the highest contribution margin per unit of constraint with $280, followed by DS1 with $145 and DS2 with $120.

	DS1	DS2	DS3
Contribution Per Unit of Constraint	145	120	280
Order of Manufacturing based on profits	**2**	**3**	**1**

- GNK can meet expected demand for DS1 (800 units) and DS3 (600 units), however it can only meet 42.86% (300/700) of expected demand for DS2.

Constraint: Machine Hours	Driveshaft Model	Numbers of Units	Machine Hour Per Unit	Total Machine Hour Required	Contribution Margin Per Unit	Total Contribution Margin
8700	DS3	800	3	2400	280	672000
6300	DS1	600	6	3600	145	522000
2700	DS2	300	9	2700	120	324000

- Without outsourcing, the current product plan only yields a 1.12% [(48000/4 301 000) Appendix 2] return on sales.
- Without outsourcing, GNK may face other threats to its reputation such as a negative customer relationship, negative publicity and inconvenience which may effect sales and thus profits
- With outsourcing, GNK may be able to retain if not increase its profits and sustain its reputation with its customer. There are risk posed by outsourcing DS1, however these can be mitigated and controlled by safeguards (quality control inspections and a contract with conditions aimed to protect GNK).
- It is recommended that GNK outsource DS1.

Main report

Introduction

A division of GNK Manufacturing Limited (GNK) makes three different types of driveshafts (DS1, DS2, DS3) aimed at local truck manufacturers.

Innovative design and high quality product has resulted in increased demand for GNK's products. As a result, estimated demand [(12,300 machine hour) appendix 1] is greater than the current production capacity (8700 machine hour).

GNK plans to expand in the future, however in the short term, GNK needs to optimise its use of its constrained resource (machine hour) to maximise profits. This report analyses the production plan and statement of the expected profit without outsourcing and discusses the benefits and disadvantages of outsourcing to recommend if GNK should or should not outsource DS1.

The production plan and statement of the expected profit (no outsourcing is allowed)

Table 1: Contribution Margin Per CNC Machine Hour

	DS1	DS2	DS3
Sales	2500	2430	2590
(less) Variable Cost	(1630)	(1350)	(1750)
Contribution Per Unit	870	1080	840
Machine Hours (Machinist total cost/ Machinist cost per hour)	6	9	3
Contribution Per Unit of Constraint	145	120	280
Order of Manufacturing based on profits	**2**	**3**	**1**

Table 1 shows the contribution margin per unit of CNC machine hour for driveshaft DS1, DS2 and DS3. The contribution margin allows GNK to maximise profits by determining which driveshaft is most profitable and thus allocate its limited resources (machine hours) accordingly.
DS3 has the highest contribution margin per unit of constraint with $280, followed by DS1 with $145 and DS2 with $120. This means that GNK should manufacture as much units of DS3 as possible, followed by DS1 and then DS2.

Table 2: Production Plan and Statement of Expected Profits

Constraint: Machine Hours	Driveshaft Model	Numbers of Units	Machine Hour Per Unit	Total Machine Hour Required	Contribution Margin Per Unit	Total Contribution Margin
8700	DS3	800	3	2400	280	672000
6300	DS1	600	6	3600	145	522000

2700	DS2	300	9	2700	120	324000
Total Contribution Margin						1518000
Fixed cost						1470000
Expected Profit						**48000**

Table 2 shows the number of units that can be produced under the constrain of machine hours (8700 hours) and the expected profits generated from this level of production.
GNK has the capacity to make 800 units of DS3 and 600 units of DS1 - meeting expected demand for DS3 and DS1.
However, GNK can only make 300 out of 700 units of of the expected demand for DS2.
With this production plan, GNK's expected profit totals $48,000.

Reservations Against Production Plan Without Outsourcing

Profits; Expected profits ($48000) from the production plan are extremely low compared to sales. GNK return on sales is 1.12% [(48000/4 301 000) Appendix 2] - this indicates that GNK is not effectively turning sales into profits. Additionally, if GNK incurs unexpected expenses, they may not have enough funds to meet their obligations. To improve this GNK needs to increase sales margin or decrease expenses.

Negative customer relationship; GNK can only meet 42.86% (300/700) of DS2 demand. This means that they lose a significant amount of DS2 buyers (57.14%) - this may damage GNK reputation as GNK is not able to meet a consumer's demand for DS2 consistently. As a result consumers may be discouraged consumer's from purchasing GNK's driveshaft, decreasing sale and thus expected profits.

Negative publicity; GNK not being able to meet customer demand consistently may earn the company a negative reputation - because GNK operates in a relatively niche market, this may mean that GNK may lose potential customers due to bad word of mouth from existing customer. This decreases future sales and thus expected profits.

Inconvenience; Truck manufacturers may want to purchase all three types of driveshafts - not having DS2 consistently available may discourage manufacturers from purchasing from GNK as it would be inconvenient to purchase drive shafts from multiple supplier. This decreases sales and thus expected profits.

By not outsourcing, GNK may not protect its reputation but instead risk it. This is because by not outsourcing, GNK may face other threats to its reputation such as a negative customer relationship, negative publicity and inconvenience. Therefore it may be more beneficial to outsource the driveshaft to mitigate these potential threats to its reputation and additionally increase its return on sales.

Advantages and disadvantages of allowing outsourcing of DS1

Advantages of outsourcing DS1

-GNK is able to meet the expected demand for driveshafts, this mitigates potential reputation issues regarding negative customer relationship, negative publicity and inconvenience. Stabilising GNK current and future customer's relations.

-GNK is able to retain customers who purchases only DS2 and manufacturers who require all three types of drive shafts. This gives GNK a competitive advantage as they retain a larger share of the drive shaft market.

-GNK would be likely be able to retain current profit margins, if not increase them. This would either mean that GNK would receive the benefits of meeting demand whilst either maintaining or increasing profits.

Disadvantages of outsourcing DS1

-GNK's point of difference is their high quality and innovative designs, by outsourcing they risk the quality of the product not meeting GNK's standards or the supplier being unreliable which may effect GNK's reputation and thus sales.

-DS1 suppliers may increase prices unexpectedly, as the sole supplier of DS1 this may effect the contribution margin GNK would receive from the sales of DS1. As a result GNK may earn a lower profit than estimated without outsourcing.

-DS1 suppliers may steal the design of DS1, as GNK's point of difference is their innovative designs, A competitor with a similar design would pose to be a big challenge and may effect the sales and expected profits of GNK.

Possible Safeguards

-In addition to the initial quality check, perform regular inspections of he driveshaft manufactured by the supplier to ensure that the outsourced DS1 are of GNK's standard. This is to mitigate any potential issues in regards to the reputation of GNK's quality.
Also to mitigate any concerns of the supplier being unreliable, GNK should perform a finance check on the supplier to ensure they are solvent. This so they will be able to consistently supply GNK with DS1 for the period of time required. Additionally, a time frame for delivery and penalties for not meeting this time frame should be included in the contract between GNK and the supplier to ensure timely supplies of DS1.

-To mitigate concerns about inconsistent pricing with the supplier, GNK should create a contract with DS1 supplier. This contract should outline an agreed and consistent price for DS1 supplied.

-To ensure that not only the supplier but competitors can not steal GNK's design for DS1, GNK should patent their designs. Additionally, in the contract between DS1 suppliers and GNK, GNK should outline a clause that prevents DS1 suppliers from producing and selling a similar product for a set amount of time.

Conclusion

It is recommend that GNK outsource DS1, this is because this option allows GNK to meet demand, retain/improve its reputation, and potentially increase its expected profits. Whereas not sourcing DS1 means that GNK earns a relatively low profit whilst putting their reputation on the line.
Additionally, the risk/threats created by outsourcing can be controlled or mitigated by safeguards whereas the risk/threats created by not outsourcing cannot be controlled or mitigated.

APPENDIX

APPENDIX 1

Total Number of Machine Hours= (UnitsDS1*HoursDS1)+(UnitsDS2*HoursDS2)+(UnitsDS3*HoursDS3)
Total Number of Machine Hours= (600*6)+(700*9)+(800*3)
Total Number of Machine Hours= 12 300

APPENDIX 2

Total Sales Revenue=(UnitsDS1*PriceDS1)+(UnitsDS2*PriceDS2)+(UnitsDS3*PriceDS3)
Total Sales Revenue=(600*1630)+(300*1350)+(800*1750)
Total Sales Revenue= 4 301 000