

## 21. Paradise Valley (PV) SL VERSION

Paradise Valley is a company based in Wales, United Kingdom that makes leather jackets. With hundreds of leather jacket companies to choose from, PV's unique selling point is that it makes its jackets to order and employs very skilled craftsmen to make them by hand, though some common components are made in batches when possible. There has always been a network of small firms in the leatherworking industry, but the area is not widely known for this, and about 30% of PV's workforce is foreign-born. The company has been around since 1963 but has made a loss in 5 of the last 12 financial quarters.

The brand has very high customer satisfaction and enjoys strong pricing power, but leaders think they need to position the brand further into the higher end of the luxury market. Sales outside of the UK make up 25% of revenue, down from 30% five years ago. In recent years there have been a series of issues in their supply chain that can make it challenging to meet their promise of timely customized production, and in some cases, customers have to wait up to 3 months for their orders to be fulfilled. If sales increased, PV would have a hard time increasing its workforce or managing its production planning, and bringing in foreign workers has become a more challenging and time-consuming process after the UK left the European Union.

Materials costs have risen substantially across the industry over the last two years, and for PV in particular as electricity prices in Wales have gone up; their cost of production is now about 15% higher than it was in 2019, and the cost of certain high-quality materials costs are up by more than 40%. In response, PV has raised its prices by 10% over this period, and most competitors have raised prices to a similar degree. Below are some average cost and revenue figures for PV for the latest year.

### **All prices in GBP (British pounds), £**

Average UK leather jacket price	£575
Average international leather jacket price	£600
PV's average shipping cost within UK	£8 per jacket
PV's average shipping cost internationally	£18 per jacket
Materials	£192 per jacket
Salaries	£53000 per month
Mortgage (loan) payment	£2500 per month
Utilities	£1500 per month
Insurance and administrative costs	£4500 per month

Because of the rising costs and the desire to expand its international sales, senior management is considering two different options to increase profits, and they would not do both options at the same time.

*(see options on next page)*

**Option 1:**

Open a second production facility in Spain to serve the international market. Spain is part of the European Union and thus has lower costs to serve the European market, and it also has a lower average wage as well as slightly lower predicted wage inflation than the UK over the next year.

**Option 2:**

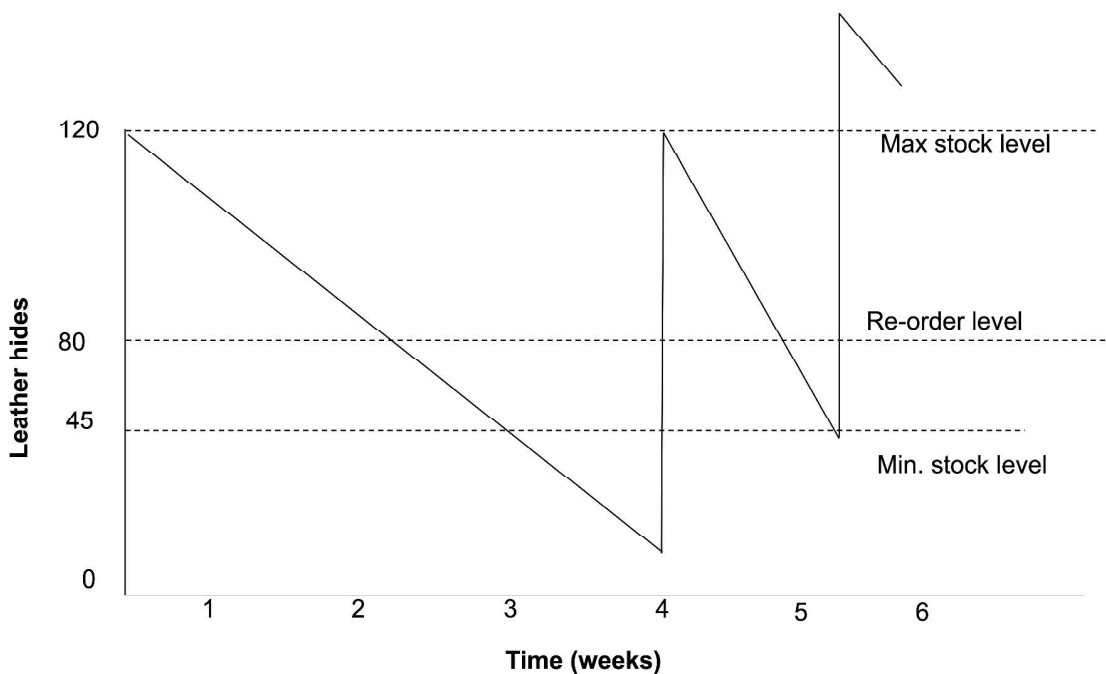
Outsource production of tanning of leather hides to a company in Portugal. Tanning is a process that most leather goods makers do not do themselves, and PV believes its cost to buy hides would be slightly less than the cost to make them. If PV outsources this it would be able to sell about £150,000 worth of fixed assets and increase their productive capacity.

Question	Marks
A. Define the term operations management.	2
B. Explain the difference in job vs batch production for PV.	4
C. Explain two factors that may have been important to setting up Wales as PV's manufacturing location.	4
D. Explain the differences between outsourcing and offshoring for PV.	4
E. Construct a monthly break-even chart for PV if they only sold jackets to UK customers.	4
F. If PV sold 200 jackets to UK customers and 50 to international customers in a month, calculate their profit or loss that month.	4
G. Analyze how PV purchasing improved computer systems for inventory management could impact its margin of safety.	4
H. Explain two limitations of PV conducting break-even analysis.	4
I. Recommend one of the options that PV is considering pursuing to improve profits.	10

## 21. Paradise Valley (PV) *HL ONLY VERSION*

Paradise Valley is a company based in Wales, United Kingdom that makes leather jackets. With hundreds of leather jacket companies to choose from, PV's unique selling point is that it makes its jackets to order and employs very skilled craftsmen to make them by hand, though some common components are made in batches when possible. The company has been run by a small group of owners for 30 years, but it has made a loss in 5 of the last 12 financial quarters.

The brand has very high customer satisfaction and enjoys strong pricing power, but leaders think they need to position the brand further into the higher end of the luxury market. Sales outside of the UK make up 25% of revenue, down from 30% five years ago. In recent years there have been a series of issues in their supply chain that can make it challenging to meet their promise of timely customized production, and in some cases, customers have to wait up to 3 months for their orders to be fulfilled. Labor productivity is high, but if sales increased, PV would have a hard time increasing its workforce or managing its production planning. Below is a recent stock control chart for leather hides used in production over six weeks.



PV attempts to use lean production techniques as much as possible, and just-in-time production in particular, but this is more challenging to implement than many other producers that use large-scale batch production and can use more machinery and internet-connected devices to monitor production than PV's workers do. PV conducts statistical analysis of data on product defect rates, rework rates, and the time it takes to perform particular actions in production to ensure that certain quality and efficiency benchmarks are met. Senior management is considering two very different options to increase profits.

### **Option 1:**

Start the process to qualify for an ISO 9001 designation that certifies that they are meeting some of the world's highest quality and efficiency standards. Most of PV's owners assume that working on ISO 9001 benchmarks would allow them to improve their status as a luxury leather goods maker and to more efficiently meet customers' needs. In addition to increased documentation and

training, PV would need to upgrade its critical software and hardware infrastructure, which may cost around £35,000 in up-front costs alone.

**Option 2:**

Outsource production of tanning of leather hides to a company in Portugal. Tanning is a process that most leather goods makers do not do themselves, and PV believes its cost to buy hides would be slightly less than the cost to make them. If PV outsources this it would be able to sell about £150,000 worth of fixed assets and increase their productive capacity.

Question	Marks
A. Define the term operations management.	2
B. Define the term labor productivity.	2
C. State two examples of data analytics that PV may use.	2
D. Explain the difference in job vs batch production for PV.	4
E. Explain two lean production techniques that may be appropriate for PV to use.	4
F. Explain two problems in PV's production planning that can be seen through the stock control chart.	4
H. Explain two factors that may have been important to setting up Wales as PV's manufacturing location.	4
I. Explain the differences between outsourcing and offshoring for PV.	4
J. Analyze how PV purchasing improved computer systems for inventory management could impact its margin of safety.	4
K. Explain two limitations if PV were to conduct a break-even analysis.	4
L. Explain two challenges that PV may experience if it were to upgrade its critical infrastructure.	4
M. Evaluate the two options that PV is considering pursuing to improve profits.	10

## 22. BlueFire Geothermal (BG) *SL Version*

BlueFire Geothermal is a startup company based in Iceland that makes geothermal heat pumps, a type of heating and cooling system that uses pipes buried underground to take heat from the earth, which is then used to heat and cool homes. BG was founded to develop better systems that are easier to install and last longer than typical units. Geothermal heat pumps can be 2-3 times more expensive to buy and install than typical heating and cooling systems, but they are much more efficient and cheaper to use. Use of these systems is limited outside of Iceland, but many governments now offer consumers and businesses subsidies and/or tax reductions to install them.

BG has spent over \$6 million so far in research and development of new heat pump systems. BG now believes it can make heat pump installation 20% cheaper and 10% faster than industry standards; the installation process is by far the largest cost to the end consumer. Last year they expanded their R&D facility to also manufacture about 100 heat pumps a year for the Icelandic market using job production, though the main function of the facility will remain ongoing R&D, and they do not expect to break even in the Icelandic plant.

With the knowledge gained in Iceland, they plan offshoring production in Mexico within the next year. Mexico offers well-developed infrastructure in the manufacturing sector, and many firms have set up operations there to sell in the US, Canada, and Mexico while taking advantage of the USMCA trade agreement between the 3 countries.

BG's founders have been planning on using mass customization to enable their systems to be installed in a wide variety of homes of different sizes and needs. Even with customization, many of the components would be the same but use different amounts of materials. This method would probably require BG to make 3 different standard sizes of the major heat pump parts - the condensers, blower motors, and heat exchangers - and to make each unit to the customer's order specifications.

However, several early investors think that BG should use mass production and offer 2 standard models to bring the unit cost of production down. One investor believes that by year 3 in the plant, BG should be able to sell 1500 units per year at a variable cost of \$5500 per unit. Market research suggests that companies that install heat pumps for consumers would be willing to pay more for BG's systems than for rivals, but BG's average initial target price is about \$1500 more than the average direct competing unit of a similar size. BG's leaders are forecasting the following numbers for the first 3 years in the facility.

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<b>Sales target</b>	500 units	800 units	1200 units
<b>Average sales price per unit</b>	\$10 000	\$10 000	\$9 800
<b>Average variable cost</b>	\$7 500	\$6 900	\$6 000
<b>Annual fixed costs</b>	\$2 400 000	\$2 450 000	\$2 500 000

Question	Marks
A. Define the term break-even.	2
B. Explain two roles of operations management at BG.	4
C. Explain an advantage and a disadvantage of BG using job production at its Icelandic facility.	4
D. Explain how the existence of a trade agreement between the US, Mexico, and Canada may be an advantage to BG locating a factory in Mexico.	4
E. Explain two potential disadvantages to BG offshoring its production of heat pumps to Mexico.	4
F. Construct a break-even chart using the data listed in the table for year 1.	4
G. Calculate the difference in the break-even quantity from year 1 to year 3.	2
H. If BG investors want to target a profit of \$1 million in year 2, calculate the price that they would need to charge to customers if they sold every unit in their sales target.	1
I. In order to earn a profit of \$2 million in year 3, calculate the target profit output.	1
J. Explain how increased spending on research and development could affect BG's break-even point.	2
K. Evaluate the decision for BG to use mass production or mass customization.	10



## 22. BlueFire Geothermal (BG) *HL ONLY*

BlueFire Geothermal is a startup company based in Iceland that makes geothermal heat pumps, a type of heating and cooling system that uses pipes buried underground to take heat from the earth, which is then used to heat and cool homes. BG was founded to develop better systems that are easier to install and to control through a smartphone in an internet-connected building. Geothermal heat pumps can be 2-3 times more expensive to buy and install than typical heating and cooling systems, but they are much more efficient and cheaper to use. Use of these systems is limited outside of Iceland, but many governments now offer consumers and businesses subsidies and/or tax reductions to install them.

BG has spent over \$6 million so far in the research and development of new heat pump systems, setting several benchmarks for installation time and cost. After completing extensive field testing, BG now has patents on five different components to make the installation 20% cheaper and 10% faster than industry standards; the installation process is by far the largest cost to the end consumer. BG's pumps are also being designed for a cradle to cradle model, and they plan on their systems being easy to recover and recycle back into new production at the end of their 20-25 year lifespan. Last year they expanded their R&D facility to also manufacture about 100 heat pumps a year for the Icelandic market using job production, though the main function of the facility will remain ongoing R&D. BG has been clear with investors that its profits will ultimately come from mass production outside of Iceland, but the Icelandic plant has only operated at 65% capacity so far, and several early investors are highly dissatisfied with BG's capital productivity.

With the knowledge gained in Iceland, they plan to offshore mass production in Mexico within the next year. Mexico offers well-developed infrastructure in the manufacturing sector, and many firms have set up operations there to sell in the US, Canada, and Mexico while taking advantage of the USMCA trade agreement between the 3 countries. To position themselves as a maker of high-quality, easy to install heat pumps that will save the end customer money in the long run, BG's chief executive and operations officers plan to implement a total quality management system at the Mexican facility. However, the same investors who want to see improvements in capital efficiency think that BG should prioritize the efficiency of their mass production to bring the unit cost of production down faster. An activist investor believes that by year 3 in the plant, BG should be able to sell 1500 units per year at a variable cost of \$5500 per unit. Market research suggests that companies who install heat pumps for consumers would be willing to pay more for BG's systems than for rivals if they can deliver on the promise of their patented technologies; BG's initial target price of a BG unit is about \$1500 more than the average direct competing unit of a similar size. Right now, BG's leaders are forecasting the following numbers for the first 3 years in the facility.

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<b>Sales target</b>	500 units	800 units	1200 units
<b>Average sales price per unit</b>	\$10 000	\$10 000	\$9 800
<b>Average variable cost</b>	\$7 500	\$6 900	\$6 000
<b>Annual fixed costs</b>	\$2 400 000	\$2 450 000	\$2 500 000

Question	Marks
A. Define the term break-even.	2
B. Explain two roles of operations management at BG.	4
C. Explain an advantage and a disadvantage of BG using job production at its Icelandic facility.	4
D. Explain two roles of benchmarking for BG.	4
E. Explain how quality control and quality assurance would differ at BG.	4
F. Explain how the existence of a trade agreement between the US, Mexico, and Canada may be an advantage to BG locating a factory in Mexico.	4
G. Explain two potential disadvantages to BG offshoring its production of heat pumps to Mexico.	4
H. Explain two reasons why an investor may see low capacity utilization as a problem for BG.	4
I. Construct a break even chart using the data listed in the table for year 1.	4
J. Calculate the difference in the break even point from year 1 to year 3.	2
K. If BG investors want to target a profit of \$1 million in year 2, calculate the price that they would need to charge to customers if they sold every unit in their sales target.	1
L. In order to earn a profit of \$2 million in year 3, calculate the target profit output.	1
M. Explain one way in which a higher than expected defect rate on a component of BG's heat pumps would alter its year 1 break-even chart.	2
N. Explain two reasons investors would want to see improvements in BG's capital productivity.	4
O. Explain the differences between incremental and disruptive innovation for BG.	4
P. Explain two ways in which data analytics could be important to BG's research and development efforts.	4
Q. Explain two challenges to BG using cradle to cradle design for their systems.	4
R. Evaluate the potential decision for BG to prioritize total quality management or efficient mass production.	10