

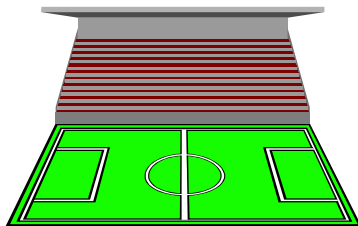
Module 2.6 – Data Modelling

Introduction

In First Year you learned how to enter text, numbers and formulae in spreadsheet cells and how to draw charts from spreadsheet data.

In this module you will create larger spreadsheets with many linked formulae. The spreadsheets will allow you to model a number of different scenarios using different data to allow you to make the most informed decisions possible.

The first scenario will put you in charge of a hotel and its finances. You must calculate the various expenses – salaries and supplies. Money is generated by the guests coming and staying at your hotel. The amount of guests will vary from season to season.



The second, more complicated scenario puts you in charge of a football club and its finances. Money is generated from television, merchandising, food sales and, of course, gate receipts. Money must be spent on players' salaries, maintenance, travel and security. It is your task to decide the most profitable route to success.

Scenario 1

You are the owner of a hotel.
The hotel has various incomes & expenditures.
You are considering expanding the hotel.

Use a spreadsheet to model a number of different options before recommending one. Your spreadsheet should calculate hotel finances for a year with figures for each season of the year. Calculate all income and expenditure per 90-day period.

Information

Hotel occupancy - the number of rooms filled - will vary with the season. In spring expect 75% occupancy, summer to have 95% occupancy, autumn to have 60% occupancy and in winter only 40% occupancy.

As the size of hotel increases so will the number of staff required and the salary demands of management.

The hotel currently has 12 bedrooms. To expand the hotel will cost £800 per room.

Summary of Expenditure

- Staff
- Supplies

Summary of Income

- Guests

Staff Salaries

Manager = £10,000 + £200 per bed
Assistant Manager = £8,000 + £150 per bed
Chef = £7,000 + £250 per bed
Receptionist = £8,000 + £40 per bed
Waitress = £5,000 + £40 per bed
Cleaners = £4,000 + £45 per bed

You have a number of options ranging from keeping the hotel at its existing capacity to increasing its capacity tenfold. You must model each option in a spreadsheet document to determine the most profitable.

Option 1 - *No expansion*

Accommodation will cost £17 per night.

Staff required = 1 manager, 1 chef, 1 cleaner, 1 waitress

Supplies will cost £4 per person per night.

Option 2 - *Small expansion*

25 beds.

Accommodation will cost £19 per night.

Staff required = 1 manager, 1 chef, 2 cleaners, 2 waitresses, 1 receptionist.

Supplies will cost £6 per person per night.

Option 3 - *Moderate expansion*

60 beds. Accommodation will cost £27 per night.

Staff required = 1 manager, 1 assistant manager, 2 chefs, 4 cleaners, 6 waitresses, 2 receptionists.

Supplies will cost £9 per person per night.

Option 4 - *Major expansion*

120 beds. Accommodation will cost £35 per night.

Staff required = 1 manager, 3 assistant manager, 4 chefs, 15 cleaners, 14 waitresses, 7 receptionists.

Supplies will cost £13 per person per night.

Task 1

Answer the following questions in your jotter.

1. If a hotel has 12 beds and is 50% full, how many beds are occupied on an average night?
2. If a hotel has 12 beds and is 75% full, how many beds are occupied on an average night?
3. If a season lasts 90 days, how many guests would come in a season if the hotel has 12 beds and is 40% occupied?

Do the following:

- Open a new spreadsheet document in Microsoft Excel
- On sheet 1 of the workbook, enter the following information

Original No. Of Beds			
New No. of Beds			
Cost Per Night			
Season	% Occupancy	Nightly Occupancy	Season Occupancy
Winter	40%		
Spring	75%		
Summer	95%		
Autumn	60%		
	TOTAL		
TOTAL INCOME			

- Enter the number of beds
- Enter and fill down formulae to calculate nightly occupancy.
- Enter and fill down formulae to calculate season occupancy by multiplying nightly occupancy by 90.

Task 2

Answer the following questions in your jotter.

1. If a hotel has 12 beds, how much would the hotel manager be paid?
2. If a hotel has 25 beds, how much would a cleaner be paid?
3. If a hotel has 60 beds, how much would be paid in salaries for 6 waitresses?

Do the following:

- Add the following information to your spreadsheet.

Staff	No. Of Staff	Salary
Manager		
Assistant Manager		
Chef		
Receptionist		
Waitress		
Cleaner		
	Total	

- Enter the number of staff for scenario 1 as described above.
- Enter formulae to calculate the salaries for the members of staff.
- Use AutoSum to calculate the total salaries paid to all members of staff.

Task 3

Answer the following questions in your jotter.

1. If the hotel has 12 beds and is expanding to 25 beds, how many new beds are being created?
2. If it costs £800 per new bed, how much will this expansion cost?
3. If 20 people stay each night and supplies cost £4 per day per person, how much would be spent on supplies in one season?
4. If you know the hotel's total income and expenditure, how would you calculate the profit?

Do the following:

- Add the following data to

Cost of Expansion	
Cost of Supplies per day	
Cost of Supplies per year	
Total Expenditure	
TOTAL PROFIT	

- Enter a formula to calculate the cost of any expansion (not applicable at option 1 but include the formula for subsequent options).
- Enter a formula for the cost of supplies based on the number of guests staying in a full year.
- Enter a formula to calculate Total Expenditure for a year.
- Enter a formula to calculate profit having calculated Total Expenditure and Total Income.

Task 4

Having calculated the profit for option 1, you must now use similar formulae to calculate income and expenditure for the other options. If you have constructed your spreadsheet correctly it should only be a matter of changing some values and the new profit is calculated automatically.

- Copy the information in your Sheet 1 and paste to Sheets 2, 3 and 4.
- Amend the number of staff for each option.
- Change the new number of rooms.
- Change the cost per night.
- Change the cost of supplies per night.
- The profit should now be automatically calculated.

Answer the following questions in your jotter.

1. How much profit is made for each option?
2. Which option would you recommend?
3. Why is major expansion not always the best option?

After discussion with your teacher, you must now choose to follow Stream 1 or Stream 2.

Stream 1 – Hotel Management

Task 5 – Profitability

Place yourself in the position of hotel manager. There are numerous factors that can increase or decrease the profitability of your hotel. You must identify your hotel's strengths and areas upon which you could improve.

In your jotter, copy and complete the following table:

	Increase Profit	Decrease Profit
1	<i>Health and Sporting Facilities</i> Having such facilities will encourage more guests to choose our hotel and guests will be more willing to pay extra to stay at our hotel if the gym facilities are good	
2		
3		
4		
5		

Identify factors that would decrease or increase a hotel's profitability. The first one has been done for you. Try to find at least five factors that can increase profit and five factors that can decrease profit.

Task 6 – Competition

In the hotel business there is always competition between hotels of similar size and cost. In order to be competitive and gain maximum profit you must be aware of your competition and identify strategies to maintain and improve your market share

Copy and complete the following table. Use your imagination to complete the details for your own hotel. Complete the remaining columns by searching for information on the Internet about hotels.

	Your Hotel	Hotel 1	Hotel 2
Name			
Location			
No. of Stars			
Catering Options			
Cost per Night			
Room Facilities			
Sport Facilities			
Entertainment			
Special Offers			
Local Attractions			
Other Information			

Answer the following questions in your jotter.

1. What is meant by market share?
2. Which factors will determine the hotel a customer chooses to stay in?
3. From your own experience, describe a good hotel that you have stayed in.
4. From your own experience, describe a bad hotel that you have stayed in.
5. Why are some hotels described as 'family friendly'?
6. What are 'all inclusive' hotels/resorts?

Task 7 – Advertising and Marketing

One of the major ways to attract guests to stay at your hotel is to advertise and promote it in a variety of ways. You must select an appropriate advertising medium and carefully select your target audience in order to maximise the return on your advertising investment.

- Produce a promotional leaflet/pamphlet/poster or brochure promoting your hotel
- Print this document
- Produce a script or storyboard for a radio or television advert promoting your hotel
- Use any of the hardware or software at your disposal to create your advert

Answer the following questions in your jotter

1. Describe the main ways of advertising your hotel.
2. How has the growth of the Internet changed the way that people find out about and book hotels?
3. What is meant by 'maximising your return' when talking about advertising?
4. In what way could your hotel receive indirect advertisements?

Stream 2 – Further Data Modelling

Scenario 2

You are the chairperson of a 2nd division football club. You must decide the future direction of the club.

Do you invest a lot of money and hope for promotion, league & cup success, European football? Or do you act cautiously; spend little to ensure the financial security of the club.

One season consists of 36 games, 18 home and 18 away games, although players are paid for 12 months of the year.

Initially your stadium has a capacity of 10,000. Upgrading the stadium will cost approximately £400 per seat.

Summary of Expenditure

- Players Salaries. These are the club's greatest expenses. Players are classified according to their salary.

Category A - £30,000 per month

Category B - £10,000 per month

Category C - £5,000 per month

Category D - £1,000 per month

Category E - £500 per month

Category F - £100 per month

- Stadium Maintenance
This includes the upkeep of the pitch, training and medical facilities and any expansion. It will cost around 5% of your gate receipts.
- Transport
Half of all matches each season will involve away games, budget for £1,000 per national game and £50,000 for European away games.
- Police/Stewards
You need one policeman/steward per 100 people. They will cost £30 each.

Summary of Income

The value of each of the following depends largely upon the success of the team and the attendance at matches.

- Gate receipts
Second division price - £8
First division price - £12
Premier league price - £17
Cup ties (all leagues) - £14
European price - £21

- Advertising
Trackside advertising & sponsorship will increase as you progress in the league. In division 2 expect £400 advertising revenue per home game. In division 1 expect £2000 advertising revenue per home game. In the premier league expect £6500 advertising revenue per home game. In European games expect £10,000 advertising revenue per home game. Cup sponsors pay £5,000 per home tie.
- TV money
All European & cup games will be televised. European home games generate £100,000 while cup and league home games generate £18,000. Two second division games will be televised per year, five first division games will be televised per year, twelve premier league games will be televised per year.
- Merchandising
Half of the people attending one league game will spend approximately £40 a year.
- Food
Three quarters of spectators will spend £4 at the pie stall every home game.

You must first decide upon the players in your team (assume a first team squad of 15). To compete in the following leagues you will need the following categories of player.

Division 2 - DDEEEEEEEEEFFFFF
 Division 1 - CDDDDDEEEEEEEEEFFFFF
 Premier - ABBBCCCCDDDDDDDE
 Europe - AAAABBBBCCCCCCCC

Option 1 - Stay Part-Time

If you decide to stay within Division 2, expect an average crowd of 250. You will play 3 cup games a year, 2 at home and 1 away.

Option 2 - Go Professional

If you decide to aim for Division 1, expect an average crowd of 1400. You will play 4 cup games a year, 2 at home and two away.

Option 3 - Aim for Premier League

If you gain promotion to the Premier League, expect an average crowd of 20,000. You will play 5 cup games a year, 3 at home and 2 away. It will be necessary to expand your stadium.

Option 4 - Aim for Champions League

If you qualify for Europe, expect an average crowd of 45,000 for 6 European ties and an increased league attendance of 35,000. You will also play 5 cup games a year, 3 at home and 2 away. It will be necessary to expand your stadium further.

Task 5

The main source of the club's income is the weekly gate receipts i.e. supporters paying to come and watch their team. Ticket prices will increase as teams are promoted and perform successfully in domestic and European competition.

- On your worksheet add the following information

Average League Attendance	
Average European Attendance	
Initial Stadium Capacity	
New Stadium Capacity	
League Match Price	
Cup Match Price	
European Match Price	

- Enter these values by finding information in the previous pages.

No. of League Games (Home)	
No. of League Games (Away)	
No. of Cup Games (Home)	
No. of Cup Games (Away)	
No. of European Games (Home)	
No. of European Games (Away)	

- Add information on the number of games played in all competitions.

Annual League Attendance (Home)	
Annual Cup Attendance (Home)	
Annual European Attendance (Home)	

- Insert formulae to calculate the total number of supporters attending home games in all competitions. NOTE – You only receive gate receipts for your home matches.

Total Gate Receipts	
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- Use a formula to calculate the total income from gate receipts for all home games played in a year.

Task 6

In this task we will use formulae to calculate additional sources of income throughout the course of the season.

- Add the following information to your spreadsheet

No. of Televised Domestic Games	
No. of Televised European Games	
Total Television Revenue	

- Enter a formula to calculate the total television revenue.

Merchandising	
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- Calculate the income from merchandising which depends upon the attendance at one league match.

Food Sales per Match	
Food Sales per Season	

- Calculate the income from food sales per match and per season.

Advertising Revenue per League Match	
Advertising per Cup Match	
Advertising per European Match	
Total Advertising Income	

- Using a formula calculate the income from advertising at cup, league and European matches.

Total Income	
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- Insert a formula to calculate the club's total income.

Task 7

In this task we will use formulae to calculate expenses incurred throughout the course of the season.

- Add the following information to your spreadsheet.

No. of Away League Matches	
No. of Away Cup Matches	
No. of Away European Matches	
Total Travel Costs	

- Insert formulae to calculate travel costs for every away game played in a season.

Player Category	No of Players
A	
B	
C	
D	
E	
F	
Total Monthly Salary	
Total Annual Salary	

- Enter the number of players of each category for Option 1
- Enter a formula to calculate the total monthly salary
- Multiply this value by 12 to calculate the total annual salary

Total Stewarding Costs per Season	
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- Using information about the annual attendance for all competitions insert formulae to calculate the stewarding costs per season.

Existing Capacity	
New Capacity	
Expansion Cost	

- Enter the existing capacity and the New Capacity of the stadium. Note – this is only applicable options 2, 3 and 4. Then enter a formula to calculate the cost of expansion if each new seat costs £400 to be built.

Total Expenditure	
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- Enter a formula to add the four outgoing expenses of travel, security, expansion and salaries.

Task 8

- Add the following information to your spreadsheet.

Profit	
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- Enter a formula to calculate the profit for one season by subtracting expenditure from income.

Having calculated the profit for option 1, you must now use similar formulae to calculate income and expenditure for the other options. If you have constructed your spreadsheet correctly it should only be a matter of changing some values and the new profit is calculated automatically.

- Copy the information in your Sheet 1 and paste to Sheets 2, 3 and 4.
- Amend the number and type of players for each option.
- Change the average attendance.
- Change the number of games played in cup and European competition.
- Change the stadium capacity.
- Change the ticket prices.
- Change the number of televised games.
- Change the advertising revenue.
- The profit should now be automatically calculated.

Answer the following questions in your jotter.

1. How much profit is made for each option?
2. Which option would you recommend?
3. Why is major investment in a football club not always the best option?
4. This scenario is a simplified model of a football club. What other major factors have not been included in the scenario and why is the calculated profit unrealistic for a major football club?
5. Why is financial success no guarantee of footballing success?
6. What advantage could be gained by investing in more top quality players?

Homework Exercise 1

1. A 20-bed hotel has a hotel occupancy rate of 50%.
 - (a) Calculate the number of guests staying in one night. (1)
 - (b) Calculate the number of guests staying in a 90 day season. (1)
 - (c) If the occupancy rate increases to 85%, how many guests would stay in a 90 day season? (1)
 - (d) If the hotel charges £17 per night, how much money is paid in one season? (1)

2. A 20-bed hotel pays a manager a basic salary of £10,000 plus an additional £200 per bed.
 - (a) What is his gross salary? (1)
 - (b) If the hotel capacity is increased to 35 beds what is his new salary? (1)

3. A 20-bed hotel spends £9.50 per person per night on food, supplies, laundry etc. Hotel occupancy for summer was 58%.
 - (a) How many guests stay, on average per night? (1)
 - (b) How many guests stay in a season? (1)
 - (c) What is the hotel expenditure for the summer season? (1)

4. A 20-bed hotel has season occupancy as follows: Spring = 75%, Summer = 95%, Autumn = 60% and winter = 40%.
 - (a) How many guests stayed in a one year period? (1)
 - (b) If each guest paid £19 per night, how much money was made in one year? (1)
 - (c) The hotel spends £4.50 per guest, per night on supplies. How much money do they spend on supplies per year? (1)

Total (12)

A+	12,11	A-	10, 9	B+	8	B-		C+	7	C-	6	N	
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Homework Exercise 2

1. Using the following information, answer the following questions.

Autumn Occupancy = 60%

Manager's Salary = £10,000 + £200 per bed

	A	B	C	D
1	Hotel Accounts			
2	Season	Autumn		
3	No Of Beds	20	Price per night	23
4	No Of Guests Per Night			
5	No Of Guests Per Season			
6	Income			
7	Manager Salary			
8	Supplies per person	4.50	Supplies per season	

- (a) What is the formula in cell B4 to calculate average number of guests per night? (1)
- (b) What is the formula in cell B5 to find the number of guests in autumn? (1)
- (c) What is the formula in cell B6 to calculate hotel income? (1)
- (d) What is the formula in cell B7 to calculate the manager's salary? (1)
- (e) What is the formula in cell D8 to calculate the amount spent on supplies in one season? (1)
- (d) If the number of rooms was increased to 35 and the nightly rate was increased to £32, what would the hotel income for autumn now be? (1)
- (f) If the number of rooms was increased to 42 and the expenses per person was increased to £11, what would the new autumn expenses now be? (1)
- (g) Why is it an advantage to use a spreadsheet for these calculations? (1)
2. Suggest **two** other ways in which the hotel could attract more customers, thereby increasing its income. (2)

Total (10)

A+	10,9	A-	8,7	B+		B-	6	C+		C-	5	N	
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Stream 1 - Homework Exercise 3

1. Name three, famous Scottish hotels and find the cost per night of staying there. (3)
2. Describe three factors that would encourage customers to choose your hotel. (3)
3. Describe three factors that would discourage customers from choosing to stay at your hotel. (3)
4. How can climate affect the success of a hotel? (1)

Total (10)

A+	10,9	A-	8,7	B+		B-	6	C+		C-	5	N	
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Stream 1 - Homework Exercise 4

1. What is the star rating as used by hotels? (1)
2. Describe the difference between a one star and a four star hotel? (2)
3. What are three ways of advertising a product? (3)
4. Which advertising methods would be most expensive? (1)
5. Which advertising methods would be most effective? (1)
6. Name two websites that allow you to book hotels online. (2)

Total (10)

A+	10,9	A-	8,7	B+		B-	6	C+		C-	5	N	
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Stream 2 - Homework Exercise 3

1. A premier division football club charges £17 to attend a league match. They play 18 league matches in a season. An average of 20,000 supporters attends each home match.
- (a) What is the total attendance for one season? (1)
 - (b) How much money is generated by gate receipts in one season? (1)
 - (c) If one steward costing £30 is required for every 100 people, how much is spent on stewarding per game? (1)
 - (d) How much is spent on stewarding per season? (1)
 - (e) Stadium maintenance costs 5% of annual gate receipts. How much is spent on maintenance per season? (1)
 - (f) Half of the people attending one league game will spend £40 a year on official club merchandise. How much money is generated in this way? (1)
 - (g) Three quarters of spectators will spend £4 at the food stalls. How much revenue does this generate at one league match? (1)
2. (a) What are **two** financial incentives to gaining entry to the Champions league? (2)
- (b) What is an added expense for gaining entry to the Champions league? (1)
- Total (10)

A+	10,9	A-	8,7	B+		B-	6	C+		C-	5	N	
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Stream 2 - Homework Exercise 4

Use the information in Scenario 2 to answer the following questions

- Using the spreadsheet below and the information in the scenario and the questions above, answer the following questions.

	A	B	C	D
1	Football Club	Division 1		
2	Average Attendance per match	1400	Ticket Cost	12
3	No of Home Matches per Season	20	Attendance per season	
4	Merchandise		Maintenance	
5	Food sales per season		Salaries	50000
6	Advertising per season		Stewarding per season	
7	Gate Receipts per season			
8	TV Money per season	3000		
9				
10	Total Income		Total Expenditure	
11				
12	Profit/Loss			

- What is the formula in cell D3 to calculate total attendance in one season? (1)
- What is the formula in cell B4 to calculate revenue from merchandising? (1)
- What is the formula in cell B5 to calculate food sales per season? (1)
- What is the formula in cell B6 to calculate advertising revenue per season? (1)
- What is the formula in cell B7 to calculate total gate receipts per game? (1)
- What is the formula in cell D4 to calculate maintenance costs per season? (1)
- What is the formula in cell D6 to calculate stewarding costs per season? (1)
- What is the formula in cell B10 to calculate total income per season? (1)
- What is the formula in cell D10 to calculate total expenditure per season? (1)
- What is the formula in cell B12 to calculate the season profit or loss? (1)

Total (10)

A+	10,9	A-	8,7	B+		B-	6	C+		C-	5	N	
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