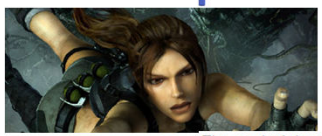
Sales Forecasting

Predicting future sales levels and trends to inform business operations such as production, marketing (distribution), workforce planning and finance.

How would sales forecasting help these functional areas?

Over-optimistic sales forecasts



The product development process for games console titles is fraught with risk. All the development costs come up front, with many titles taking 18-24 months to be designed and tested before launch to the consumer market. Getting the sales forecast right for such products is important. The games developer needs to be reasonably certain that a new title will earn a satisfactory rate of return. For Eidos, it could have used previous sales volumes of the earlier Tomb Raider titles as a guide. It would also have discussed market conditions with its distributors in key consumer markets to get their views on likely sales volumes.

For Eidos, their main product is the Lara Croft Tomb Raider franchise. The latest installment - Tomb Raider Underworld - was launched in November 2008. However, although the product has sold substantial quantities, these have been less than the market, and Eidos management, were forecasting. In fact the sales shortfall so far is around £20m. Eidos has admitted it sold only 1.5m copies of Underworld between 18 November, when the game was launched, and the end of 2008. Eido's retail distributors have also had to offer heavy price discounts in order to shift the product.

The announcement of the sales shortfall triggered a profits warning from Eido and an admission that the company may breach key loan agreements with its banks. Not a good sign. The news marked a torrid 2008 in which 92 per cent has been wiped off the Eidos share price.

Approach 1 – Ask the Experts

- Sales force composite
- Delphi method
- Consumer surveys
- Jury of experts

Qualitative methods

Approach 2 – Analysing Past Sales

Correlation looks at the strength of a relationship between two variables

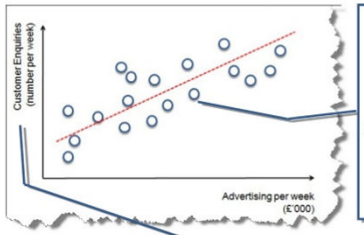
Correlation Variables

Dependent Variable

The variable that is influenced by the independent variable

Independent Variable

The factor that causes the dependent variable to change



Correlation is usually measured by using a scatter diagram, on which data points are plotted.

The dependent variable is normally plotted on the y-axis: the independent variable on the x-axis

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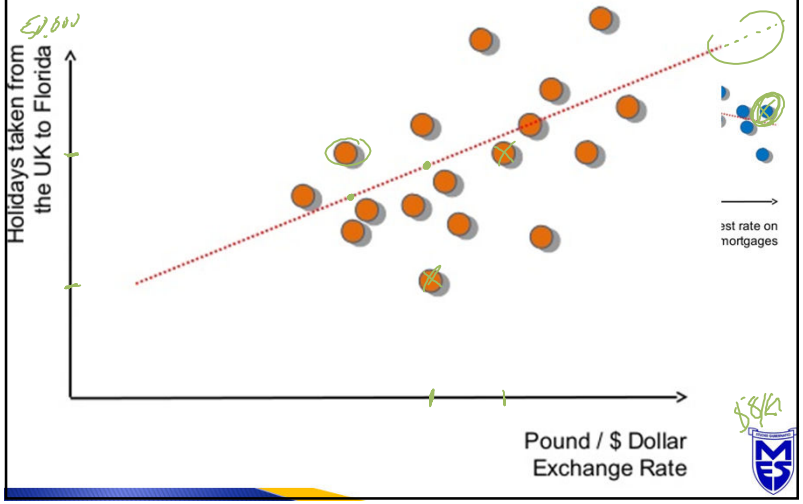
Positive, negative or no Correlation?



Evaluating Correlation

- Can be used to identify factors that may be affecting sales.
- Can extrapolate into the future and adjust business strategies in line with sales forecasts
- Correlation does not prove cause and effect…there may be other factors at work….

Approach 2 – Analysing Past Sales

2. Time Series Analysis – plotting past sales data on a graph chronologically, then extrapolating (extending the time series line) to predict future sales (fig. 18.6)

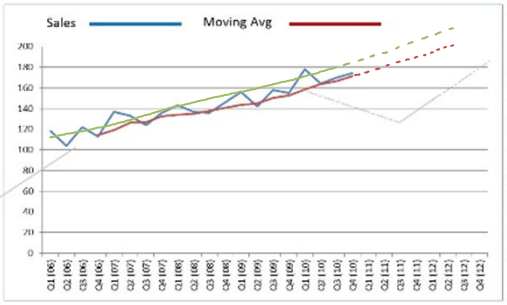
This assumes however that the sales pattern is stable, but this is not always the case…

'Extremes of data'

Fluctuations that mean the sales line jumps between extremes, making extrapolation difficult.

1. Seasonal – regular, repeated variations in sales that occur within 12 month periods
   - E.g.? Summer (July) sales of ice cream, total rains. Holidays
2. Cyclical – variations in sales that occur in periods more than 12 months, usually related to the business cycle
   - E.g.? GDP (boom/recession) Income
3. Random – variations that can occur at any time.
   - E.g.? Political/social issues Tesko/fashion Income Staff issues Competitor Natural disasters

Moving Averages Illustration



The red line shows the quarterly moving average. This is calculated by adding the latest four quarters of sales (e.g. Q1 + Q2 + Q3 + Q4) and then dividing by four.

The blue line shows the actual quarterly sales figure which varies quarter by quarter

Calculating Moving Averages

Examination questions will mostly be concerned with identifying the trend and seasonal variations.

1. Add sales for each time period to produce a total
2. Write this in the bottom/final period of the cycle
3. Divide by the number of periods in the cycle
4. Write this average in the middle of the period cycle in the 'average' column.

Based on a 'four-period' cycle

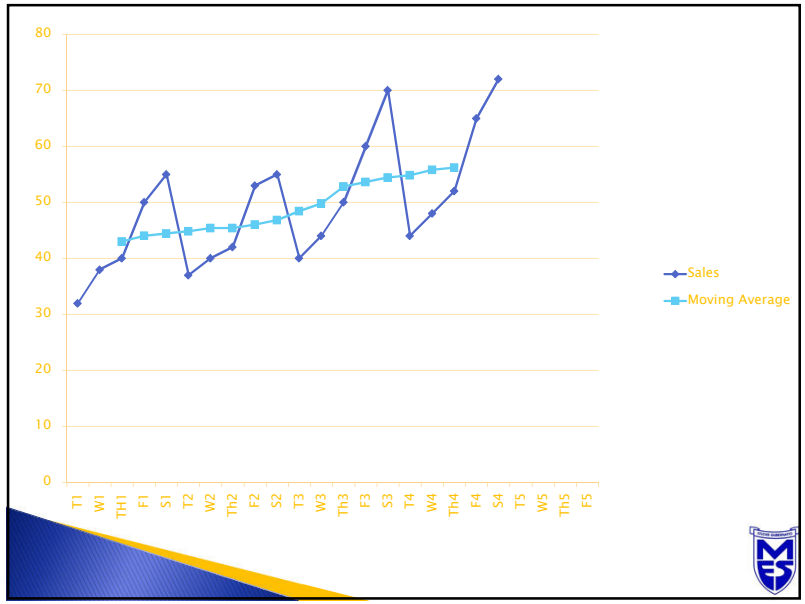
Quarter	Sales	4-Quarter Total	4 Quarter Average
1	20		
2	30		27.5
3	50		
4	10	110/4	

Calculating Moving Averages

Quarter	Sales	4-Quarter Total	4-Quarter moving average	Moving average trend
1	20			
2	30			
3	50		27.5	(27.5+28.9)/2 = **28.2**
4	10	110/4	28.8	**29.4**
1	25	115/4	30	**30.6**
2	35	120/4	31.2	**31.9**
3	55	125/4	32.5	
4	15	130/4		

Moving Daily Variation

		Sales	Moving Total (5 period)	Moving Average
Week 1	Tues	32		
	Weds	38		
	Thurs	40		43
	Fri	50		44
	Sat	55	215	44.4
Week 2	Tues	37	220	44.8
	Weds	40	222	45.4
	Thurs	42	224	45.4
	Fri	53	227	46
	Sat	55	227	46.8
Week 3	Tues	40	230	48.4
	Weds	44	234	49.8
	Thurs	50	242	52.8
	Fri	60	249	53.6
	Sat	70	264	54.4
Week 4	Tues	44	268	54.8
	Weds	48	272	55.8
	Thurs	52	274	56.2
	Fri	65	279	
	Sat	72	281	



Calculating Seasonal Variations

Regular and repeated variations that occur in sales data within a period of 12 months.

SV = sales result – moving average

Negative results mean the sales for that day/week/month/quarter are lower than usual.

Positives mean sales are higher than usual…implications on strategy?

Q	Sales	Q moving average	Seasonal Variation
1	120		
2	140		
3	190	146.25	190–146.25 = **43.75**
4	130	150	130–150 = **–20**
1	130	156.25	590–156.25 = **–26.25**

		Sales	Moving Total (5 period)	Moving Average	Daily Variation
Week 1	Tues	32			
	Weds	38			
	Thurs	40		43	**–3** (40–43)
	Fri	50		44	**6**
	Sat	55	215	44.4	**10.6**
Week 2	Tues	37	220	44.8	**–7.8**
	Weds	40	222	45.4	**–5.4**
	Thurs	42	224	45.4	**–3.4**
	Fri	53	227	46	**7**
	Sat	55	227	46.8	**8.2**
Week 3	Tues	40	230	48.4	**–8.4**
	Weds	44	234	49.8	**–5.8**
	Thurs	50	242	52.8	**–2.8**
	Fri	60	249	53.6	**6.4**
	Sat	70	264	54.4	**15.6**
Week 4	Tues	44	268	54.8	**–10.8**
	Weds	48	272	55.8	**–7.8**
	Thurs	52	274	56.2	**–4.2**
	Fri	65	279		
	Sat	72	281		

Average Seasonal Variation

We can also calculate the average seasonal variation to 'smooth' these results out as well.

1. Add all the seasonal variations for each separate period (ie. all Q1s, all Mondays etc.)
2. Divide by the number of results to get the mean average
3. Enter the result against ALL of that period

For Fridays:
The weekly variation for Fridays is 6+7+6.4/3 = 6.5

		Daily Variation	Avg Seasonal Variation
Week 1	Tues Weds Thurs **Fri** Sat	 -3 (40-43) **6** 10.6	-9.2 **6.5**
Week 2	Tues Weds Thurs **Fri** Sat	-7.8 -5.4 -3.4 **7** 8.2	-9.2 **6.5**
Week 3	Tues Weds Thurs **Fri** Sat	-8.4 -5.8 -2.8 **6.4** 15.6	-9.2 **6.5**
Week 4	Tues Weds Thurs Fri Sat	-10.8 -6.8 -4.2	-9.2 **6.5**

Forecasting using Moving Averages

To calculate expected sales for Friday of week 5, we…

1. Plot the trend (moving average) line on a time series graph
2. Extrapolate the line into the future and read off for the period under review (Friday week 5 = 70?)
3. Adjust this by the seasonal variation for Fridays (add 6.4)
4. Forecasted sales = 76.4

Use this method to complete the table and predict sales for Tues, Weds, Thurs and Sat of week 5

Evaluating the Moving Average Method

- Makes predictions more accurate than simple correlation or unfounded predictions
- Assists planning and management of operations/resources to avoid disaster
- Accurate in the short term, assuming the PEST factors are stable
- Assumes all data is accurate
- Complex
- Ignores qualitative factors, such as 'gut feeling'

In conclusion…

…no method or combination of methods can predict the future exactly, but forecasting does help reduce the risks posed by unforeseen future changes to an acceptable minimum.

Calculating Moving Averages

Quarter	Sales	4-Quarter Total	4-Quarter moving average	Moving average trend
1	20			
2	30			
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4	10	110/4	28.8	**29.4**
1	25	115/4	30	**30.6**
2	35	120/4	31.2	**31.9**
3	55	125/4	32.5	
4	15	130/4		

Year	Quarter	Sales Revenue $m	4-period moving average	Moving average trend	Seasonal variation
2007	1	10			
	2	12	11.75		
	3	15	12.25	12	3
	4	10	13.25	12.75	–2.75
2008	1	12	14	13.625	–1.625
	2	16	14.25	14.125	1.875
	3	18	14.5	14.375	3.675
	4	11	14.75	14.625	–3.625
2009	1	13	15	14.875	–1.875
	2	17	15.25	15.125	1.875
	3	19	15.5	15.375	3.675
	4	12	16.25	15.875	–3.875
2010	1	14	17	w	y
	2	20	17.75	x	z
	3	22			
	4	15			

Year	Quarter	Sales Revenue $m	4-period moving average	Moving average trend	Seasonal variation
2007	1	10			
	2	12	11.75		
	3	15	12.25	12	3
	4	10	13.25	12.75	–2.75
2008	1	12	14	13.625	–1.625
	2	16	14.25	14.125	1.875
	3	18	14.5	14.375	3.675
	4	11	14.75	14.625	–3.625
2009	1	13	15	14.875	–1.875
	2	17	15.25	15.125	1.875
	3	19	15.5	15.375	3.675
	4	12	16.25	15.875	–3.875
2010	1	14	17	w 16.625	y 2.625
	2	20	17.75	x 17.25	z 2.75
	3	22			
	4	15			