The challenge of numbers

Many students find the numerate elements of business studies difficult. In the first article of a new series, ***David Dyer*** *shows how to present graphs, diagrams, tables and accounting data effectively*

Your first acquaintance with using numbers in business studies will probably be your coursework. To complete this you will have to distil sufficient information from data available and turn it into evidence to solve the problem.

In searching for your evidence you will encounter data in a variety of forms, among them:

- **Secondary data** (see Bruce Jewell's article on secondary data on pp. 2–3). This kind of data often tells you how to use techniques and apply concepts. If you want to use break-even techniques, ratio analysis or a frequency distribution you must first learn what they are, what they may be used for and how to use them. You must also understand their limitations in your problem-solving situation. Without this data you will not do well but it is never a substitute for research. The trap to avoid is relying on books which deal with ideas in ways which are too general or at too low a level.
- **Organisation data** — some of this will be secondary i.e. already collected in the firm but not specifically related to your problem. It may prove useful as background material but is not likely to provide evidence to solve the specific problem which you are researching. Some will be relevant where the problem has occurred before or work has been done on possible solutions. Some will help in defining or illuminating the problem, some will need to be worked upon to yield the evidence you require e.g. the final accounts or sales forecasts and returns.
- **Data which the organisation collects regularly** — all coursework will need this kind of data but you will need to consider your objectives and your methods carefully before deciding what you want and the form in which you need it. You must ensure that it will be sufficient evidence. You cannot, for example, solve a marketing problem without collecting information from customers and potential customers. You cannot use generalised data when you need responses from individuals.
- **Personal research data** — this is the stuff of which good coursework is made. The evidence you collect will be unique but, unless you have worked well beforehand, could also be useless. You must know the data you want, the form you want it in, where it is best collected and how precise it should be. You must be sure the sample sufficiently reflects the population.

Distilling and bottling the evidence

In most of the reports I read I find methods of presentation and data handling which are far too crude. They are used more because the writer can do these things on the computer than for any other reason. Figure 1 provides a checklist which may not meet every occasion but which will help you to get things right for your problem and chosen solutions.

Figure 1
Presentation checklist

- Are the figures effective?
- Is the order logical?
- Is the pattern discernible?
- Does it need to be summarised?
- Does it make the position clear?
- Does it need explanation?
- Can it be interpreted in ways you need?
- Will the figures be usable for your purposes?

Effectiveness

People often find it difficult to think in terms of 2.8 children or in terms of 17.3 passengers on a bus. These may be mathematically correct but it is better to multiply away the decimal point or to round up the numbers. You cannot break even with 17 passengers and you cannot have 17.8 so the answer must be 18. Any numerical exercise is only as accurate as its most inaccurate element. Figure 2 gives an example.

Figure 2 *Rounding figures*

Original	Rounded
1899	1900
541	540
46.2	46
4.37	4.4

Precision situations do not permit rounding but most business decision situations are not that precise and rounding is sensible as well as easier. Effectiveness also requires you to estimate as you calculate, so that error can be diagnosed before it is compounded. Write down each stage of a calculation so that it is easier to check. There is danger of over-rounding. It would be overdoing it if the last three numbers in Figure 2 became respectively 500, 50 and 4.

Logic

Logic arises partly from the rules of arithmetic, partly from the nature of the data, but largely from the problem that has to be solved and your chosen methods.

Example: Presentation of newspaper sales in order of the days of the week is essential if fluctuation shows

a day-based pattern but useless otherwise. Normally a frequency distribution will be employed which shows the likelihood of a particular sales volume.

Example: Representing sales by revenue in a multi-product shop would obscure information about which products were selling well and which were not selling at all.

Example: Representing labour turnover purely as

$$\frac{\text{Number who left in the period} \times 100}{\text{Number employed}}$$

is of no value if you intend to explore ways in which labour turnover can be minimised. You have to have more detail about who left and what their status was.

Numbers are always better if they are ordered, but the ordering must be logically related to your purpose and facilitate it.

Patterns

If a pattern can be discerned numbers are easier to interpret and use. Look for a pattern and find ways of displaying which emphasise it or smooth it out if you are interested in long-run underlying movements.

Example: If your problem involves seasonality, e.g. finding customers for a hotel in winter or at weekends, you must demonstrate the seasonal pattern and its extent.

Example: If you are interested in the long-run trend of sales or unemployment use a technique to seasonally adjust the figures to reveal the general trend.

Example: Suppose responses to a question were:

Never	21
Occasionally	18
Regularly	19
Very often	20
Always	22

A pie chart would *not* demonstrate the small differences. A bar chart would because however small the differences the line would be broken.

Summarising

Whenever you use one or a few figures to represent a range, you are summarising and you should be aware of the range, the arithmetic mean (average), the mean and the mode as ways of representing data. The frequency distribution is also a summary because it bunches data logically. The most common of these is the average and you must be certain that it is a meaningful figure before using it.

Figure 3 *The deceptive average*

							Average
Range A	66	20	17	16	13	12	24
Range B	26	26	24	24	23	21	24
Range C	46	34	18	18	18	10	24
Range D	44	24	24	24	24	4	24

Consider the four sets of figures in Figure 3. They all give the same average. Only in the case of Range B is the average an effective representative of the data. Range A is distorted by one large figure and Range D by a small one. Range C has the peculiarity than none of the numbers is anywhere near the average which is therefore a completely useless representation. In Ranges C and D the mode would be a better figure.

Clarity and explanation

There are ways in which you should always attempt to make things clear. Some of these are shown in Figure 4.

Figure 4 *Making the reader understand*

- Label diagrams correctly
- Make the units you are working in clear
- Choose an appropriate scale or unit
- Choose an appropriate presentation method
- Obtain answers in a usable form
- Optimise the use of lines and spaces
- Order the work logically
- Provide a narrative for each line of working
- Explain language or diagrams as necessary
- Put explanations adjacent to the work

Interpretation, analysis and use

The purpose of collection and presentation is *use*. You may collect information which has no practical use. It should not appear in your work — take it out. Very often the data has potential use but is of no value because of the method of collection. For example:

Question Would you buy this product ?

Answers No
Perhaps
Don't know
I might
Yes

There are only two definite answers, the rest are vague and cannot be quantified. A better method of collection would be:

Question: How often would you buy this product?
(Please tick one of the statements)

Answers: Never
Once a year
Twice a year
More than twice
Monthly
Weekly

Dealing with accounting data

There are some special features about accounting data:

- There are statements or techniques with required procedures or layout e.g. the determination of a break-even point or the presentation of a profit and loss account.
- Within most statements layout is predetermined by the purpose. There are several ways in many cases and which one is chosen is irrelevant provided the logic is maintained e.g. balance sheet layout.
- An important aspect of accounting statements is that they are compared over time or with other statements. This means they must be consistent, following the same assumptions, conventions and procedure from year to year.
- The state lays down certain legal requirements, e.g. balance sheets must be a 'true and fair view' and certain facts about the business must be disclosed. It is these requirements, the natural reluctance of businesses to reveal certain information and the requirements of stakeholders which lead to the need for interpretation which I will consider in a later article.

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