

The Value and Use of Statistics

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STATISTICS are usually voted dull and useless, and for this conclusion there are good reasons. Statistics frequently *are* dull and useless, but they are not necessarily so. If they are useless it is because the right kind of information has not been collected, the right method of tabulation has not been adopted, or the figures have been wrongly analysed. If the right kind of information has been sought, and the right form of tabulation and analysis employed, the statistics will be of interest to the person who is really interested in the subject with which the statistics deal. To the anthropologist, statistics of the birth rate, death rate, stature and ages of the natives of some remote islands in the South Seas would be, perhaps, interesting. To the cotton broker they would be of no interest; but he would be much interested in the statistics of the crops, stocks, and price movements in the principal cotton-producing countries of the world. The utility of statistics, let me repeat, depends upon the collection of the right kind of information, the proper analysis of this information, and a suitable presentation of the information in a way that enables the salient points to be readily grasped. To collect unnecessary

information serves no purpose; and to present suitable information in an unsuitable form serves little purpose. The statistician, even in the business house, must have an eye for figures, and must have penetration sufficient to discover the right kind of facts to tabulate; and he must possess a knowledge of ways of presenting these facts.

Every business man calls upon his past experience to help him to meet new situations and problems as they arise. Statistics embody the records of past experience; hence their value. They provide a record of the past and a guide for the future. Before we can discuss a subject with advantage we must know the correct facts. A census is taken every ten years, and records of births, deaths, and marriages are kept. These records are not compiled for fun, but for a very serious purpose. They throw light upon innumerable social problems, and give guidance to statesmen in the framing of legislation. Upon our vital statistics the science of life insurance is based. The actuary of an insurance society can tell from the public records what is the probable life of a person of every age, and the society can then fix a premium which bears a reasonable relation to the advantages conferred upon the insured. Similarly, the payment for annuities is determined by the probability of life, which is ascertained from the vital statistics. Some persons may live longer than is anticipated, others not as long; but the statistics give us a guide of what is likely to happen on the average and in the mass.

In the hands of those who can compile the right kind of statistics, and present their salient features in a form enabling them to be easily comprehended, statistics are extremely valuable. This is so much

the case that some of the most acute minds among our great scientists have worked for generations in perfecting statistical methods; and, as a result, statistics ranks to-day as a science which is taught in our universities, and is one of the subjects in the course for certain degrees. Yet, so lightly are statistics valued that some men holding high positions have thought that statistics could be compiled by the office boy! Statistics so compiled are not likely to be of much service; but compiled by a responsible member of the office staff who has some imagination, and is interested in his work, excellent results can be achieved. He must, of course, have knowledge of what he is seeking through his statistics. He must be able to decide when strict accuracy is required, and when time-saving approximations will suffice. Also, he must be reliable and patient in his work. A good wage to a good statistical clerk is money well earned, and is a wise expenditure.

It is said that only foolish people refuse to be guided by past experience, and those who ignore statistics accord pretty nearly with this description. Few things are more remarkable in the industrial and commercial changes of the nineteenth century than the evolution of the professional director and manager, the business man who knows little or nothing of the technical processes of the businesses he directs, but who has an eye for figures, and can tell from statistics placed before him what are the weak spots in the organisation of the business he controls. He can tell whether the non-success of a business is due to faults in buying, to uneconomical production, to a too-heavy expense of distribution, to the charging of insufficient prices for the finished goods, or to some other cause. He then calls upon those having responsibility for that section where the weakness lies,

and seeks to have the weakness removed; and if the person responsible for that section cannot remove the weakness he is replaced by one who can. If the turnover in relation to capital is too small, efforts must be made to increase the turnover. If the capital employed is too much for the services it can render, then interest is being paid upon dead capital, and any unprofitable capital must be repaid.

The co-operative movement has a long way to go before it reaches the level of efficiency attained by some of its competitors in this respect. It is said, for example, that the managing director of some of the multiple shops knows by Monday noon of each week what profit each branch has made during the preceding week. This result is made possible by the compilation of suitable statistics; and the same result is possible in the co-operative movement if we organise ourselves to attain it; but not many societies even attempt to place themselves on such a business-like footing.

For the neglect by so many business men of such an excellent aid and stimulus to business efficiency several reasons can be given. Statistics take much time to prepare, and their preparation can be carried too far, when the benefit gained becomes small compared with the outlay in obtaining it. The wrong information is often collected, and the time spent in collecting it is thus wasted. Sometimes the analysis of the information is not carried far enough. Thus our own Congress statistics contain a wonderful amount of useful information, but this information is not disclosed unless the analysis of the statistics is carried a little farther than it has been carried in the past. Again, the information collected does not of itself give guidance for the

future. It only helps the user of the statistics when he is forming his judgment, and deciding his future course of action. He must still consider how far the influences of the future will differ from those of the past, and he must shape his course of action accordingly; also, the user of statistics must have an eye for figures and statistics. By this I mean he must have that intuition or developed ability which will enable him to learn the lessons of the statistics, and take out what is most important.

Even before statistics were compiled sailors had discovered that at certain times of the year in certain parts of the world the south-westerly winds blew most days of the week, and they arranged their voyages accordingly. Modifying influences might affect the winds in any particular week, but past experience told them that they could rely upon the south-westerly winds being predominant. These sailors were statisticians, though they compiled no list of figures. They memorised the information which we should to-day record and tabulate, to our greater advantage.

In the factory it is very evident that beyond a certain number of hours per week, each additional hour worked by the producer gives a diminishing yield—this has been discovered in the munition factories, where overtime has been reduced in order to increase the output—but in order to find out what number of hours secures the maximum output it is necessary to make experiments, and record the results for purposes of comparison. This means the compilation of statistics, and the advantages are obvious. The sailor was well enough served by a general knowledge of the direction of the prevailing winds, but the business man is dealing with phenomena that are much

more regular in their recurrence, and he can and must have more accurate records than the sailor needs. Without them, the business man could not act with the same wisdom that he now does

In the factory, during recent years, the compilation of cost accounts has become important. The old-fashioned method of forming estimates that were little more than guesses at the cost of production has passed away. Fairly elaborate statistics are kept of the cost of labour and materials in every process through which an article passes during its course of production; and from these statistics reliable estimates of future costs can be made. Statistics substitute scientific action for rule-of-thumb methods.

It will probably now be desirable and serve our present purpose best if I direct your attention to co-operative statistics and statistical forms and methods. The first thing a statistician would do in establishing a system of statistics for a business undertaking would be to ask what purpose it had to serve. I take the following as being important information required by the committee of a retail distributive society, but this list does not include all that a progressive committee would desire to know.

MEMBERSHIP.

Accessions and withdrawals during the week, month, quarter, and for year up to date. Comparison with corresponding period in previous quarter, and corresponding period of previous year or years.

CAPITAL.

Amount deposited as share and loan capital (and amount withdrawn) during week, month, and quarter, and for year up to date.

Comparisons with corresponding period in previous quarter, and corresponding period of previous year or years.

Special notes would be required at the quarter end showing amounts of dividend declared and of interest accrued, with a statement of the amount paid out and the amount added to share capital.

At the end of the year a statement of capital per member might be compiled giving a comparison with previous years and including a statement of the number of members holding various amounts of capital, this being prepared in order to find out whether the bulk of the capital was held by a few or many members, e.g., 100 members, or 10 per cent of the total, held less than £1 each; 200 members, or 20 per cent of the total, held between £1 and £2 each.

The amount of capital invested in own business and amount invested outside, and how invested, should also be shown. The bank balance and cash in hand should be separately shown in order to prevent the holding of unnecessary amounts and the loss of interest that might be secured by suitable investment.

Income earned by investments and amount of profit or loss when compared with interest required to be paid to members should also be shown.

TRADE.

Amount of sales in total and departments showing a comparison of previous week with corresponding week of previous quarter and the same week in the corresponding quarter of previous year or years.

Also sales up to date for the quarter and year, with comparisons with previous years.

The sales per member (gross and departmental) should also be given, and necessary comparisons with previous periods, in order to show whether the society is increasing or losing its hold upon the loyalty of its members.

The relation of sales to capital invested in own businesses to discover frequency of turnover and the relation of profits to sales and capital.

CASH.

The amount of cash received and paid should be shown, the heads of receipts being shown as well as the balance given to begin and at end; comparisons should also be given where useful.

WORKING EXPENSES.

These should be carefully compiled and show how they compare with the previous week, the corresponding week of previous quarter, and with the corresponding quarter of previous year. The working expenses for the quarter up to date with the necessary comparisons should also be given, and these working expenses quarterly, if not weekly, should be classified under the various headings, and each item given as a percentage of the whole and as a percentage of the sales, in order to discover whether the working expenses in relation to sales are rising, and, if so, what particular items are rising most.

DEBTS.

These should be shown both in total and per member, and comparisons with previous week, quarter, and year should be shown also.

PURCHASES—STOCKS.

The amount of purchases (approximate) distinguishing between contracts and orders. The value of goods received may be given, along with comparisons for corresponding periods.

The estimated departmental and general stocks should also be given, and proper comparisons also presented.


Some suitable forms of statistical tables for committee purposes I shall show you later through the medium of lantern slides.

I have been favoured by several secretaries with copies of the committee statistics which they prepare, and the variety of method is great. Many of the suggestions I have included above are already being carried out by one or more societies, but I would like to suggest greater uniformity in this matter, and the adoption in a common system of the best features of the system of each society. It might even be possible, after some efforts in this direction have been made, to publish a book dealing with statistical methods for the use of co-operative officials.

It would also be of considerable assistance and lead to several useful results if societies could be persuaded to meet in small groups, in order to compare the methods of working their different departments. For this purpose each society would require to compile statistics uniform with those compiled by other societies, and it would then be easy to see which society was working a particular department with the greatest advantage. Other societies could then copy the method of operating that department, and all would benefit from the exchange of ideas and views.

I want to say something now in regard to the visualising of statistical information.

Tables of figures, though containing much useful information, do not always present this information in a manner facilitating its assimilation. To overcome this difficulty, statisticians adopt various devices for the purpose of visualising statistical information. By means of slides, I shall show some of the methods adopted and you will be able to see the utility of the various methods, and I think you will also be convinced that statistics convey many useful lessons. Some of the tables of figures which I shall present to you by means of lantern slides, you will find in the Report of the Survey Committee presented to the Lancaster Congress, and you will agree with me, I hope, that they throw a flood of light upon the recent history and present position of the co-operative movement. The methods of presenting statistical information in graphic form I can, unfortunately, show you only through the medium of the slides, and I cannot pretend to deal to-day with the detailed preparation of statistics in the various graphic forms.

One of the most frequently-used forms of graphical presentation is that of line graphs, or curves. The units of measurements are given at the sides of a figure of this shape , periods of time, perhaps, being stated along the base. Thus, if we were recording weekly sales we might divide the sides into equal divisions, each representing £100 or £1,000, as necessary, according to the volume of trade of the society. The base would be divided into 52 equal parts. If the trade in the first week of the year were £10,000 a dot would be placed opposite the £10,000 point on the vertical scale and opposite the point on the base indicating

the first week. Similarly for each succeeding week a dot would be placed opposite the appropriate point of the vertical scale, and the appropriate spot on the base line. By joining these dots a line would be formed which would show the fluctuations of the weekly sales and the general trend of the weekly sales—upward or downward—during the year. If the sales for two or three years were similarly recorded on the same diagram, in inks of different colours, the curves would show clearly each year compared with its predecessors.

Instead of recording the sales, year by year, on the same diagram, we might have recorded the wages, expenses, or stock, and this would enable us to discover whether wages, expenses, and stocks went up and down with the sales. These curves provide a useful means of finding correlation between important facts.

From a slide which I shall show you, you will see how the curve of unemployment moves up and down with the curve of foreign trade, and how the curve of pauperism and marriage-rate is related; and from another slide you will see how prices have risen with the increased output of gold; whilst other slides will show other related facts, the relation being more clearly seen from the presentation in graphic form.

Prices of the more important commodities might be recorded by means of these line diagrams, and from a glance at the curves we should get a better general idea of the trend of prices than from an inspection of a column of figures.

Columns and circles can also be used for purposes of visualising statistical data, but these and other forms can be better explained and illustrated when I come to speak with the lantern slides as illustrations.

I wish to say, in conclusion, how very important I believe the question of statistics to be to the co-operative movement. I do not think we have yet realised what a great amount of help we can derive from suitable statistics, and I hope that one result of my lecture will be the stimulating among secretaries of a greater interest in the subject, leading to developments of a useful character. I have great hopes, too, that soon we shall have a properly-equipped statistical department at Holyoake House,* to which societies and their secretaries can turn for information upon statistical methods as well as upon points of business administration, which a statistical department could make plain for us. Further, I hope that some day we may think it desirable to include statistics among the subjects which our students who aspire to secretarial qualifications should study.

NOTE.—The principal part of this lecture was given by means of descriptions of tables of statistics and of graphic methods as depicted upon the screen from lantern illustrations.

* This department has now been established.

TABULAR STATEMENT OF SALES, WITH COMPARISONS FOR PREVIOUS PERIODS.

Weekly Report on Sales for Second Quarter ending 30th June, 1916.

Week of Quarter.	S A L E S.						
	For Week.	Corresponding Week last Quarter.	Corresponding Week last Year.	For Quarter up to date.	Last Quarter up to corresponding Week.	This Year up to date.	Last Year up to corresponding Week.
	£	£	£	£	£	£	£
First.....	2,000	1,800	2,000	2,000	1,800	32,000	31,200
Second.....	2,300	2,000	2,100	4,800	3,800	84,800	33,300
Third.....	2,500	2,200	2,200	6,800	6,000	36,800	35,500
Fourth.....	2,200	2,300	2,000	9,000	8,300	39,000	37,500
Fifth.....	1,900	2,000	1,900	10,900	10,300	40,900	39,400
Sixth.....	2,000	1,800	1,900	12,900	12,100	42,900	41,300
Seventh, &c.

NOTE.—The above is given as an example of the various tables exhibited at the Lecture.

11

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