any of the benefits of modern society that exist outside the bamboo and mud walls of its native huts.

Whilst lacking the exceptional attraction created by the Middle East construction industry boom for private practices to set up branch offices, Papua New Guinea must be an interesting choice of location for less established quantity surveyors thirsting for adventure and prepared to acquire a great deal of experience, not entirely in the traditional field of quantity surveying.

After all, where else can a quantity surveyor utilise his professional expertise in an emerging Stone Age environment by spending more time in light aircraft visiting sites than his average counterpart in Britain spends in a car doing likewise?

Education and Research

RESEARCH AND THE QUANTITY SURVEYOR

By E. R. Skoyles, MPhil, FRICS, FIQS

Introduction

Quantity surveying practice has existed for many years. During its evolution it has been subject to relatively little development. The principles of measurement in use today are similar to those used when the profession was founded from the "measurers" who served former trades by "billing", (i.e. accounting for the services after the works were completed). Although very many changes have taken place in building practice those in the "quantity surveying" field have been mainly concerned with developing the presentation of the technical accounting documentation. Little attempt has been made by quantity surveyors to challenge the principles on which the profession is based or to examine if they are correct or could be improved.

It was mainly due to the post-war dictates of building demand which brought about the first reshaping of the tendering documentation when elemental bills were introduced, *circa* 1950. While the development of elemental bills has since been described as non-research, credit must be given to the pioneers of those relatively few developments which have been successfully applied in practice.

The objective of this paper, rather than to review research work in progress or give credit to the few who have undertaken studies, is to stimulate the need for more. It is hoped that this will stimulate more research work into the widest field of quantity surveyors thinking and practice and help those who want to undertake research to do so on sound principles.

There are many people who feel the quantity surveyor has little contribution to make to research. Such thoughts only come from people who do not understand the profession's breadth of training. In many cases, the quantity surveyor is possibly the most suitably qualified person of all persons in the construction industry to undertake research in building economics.

Misunderstandings which exist about quantity surveyors stem from the view formed when outsiders to the profession quite correctly criticise them for lacking forward thinking or failing to critically examine other techniques used.

Research into Quantity Surveying

Research into quantity surveying has not been widely publicised. The Institute conducted a survey of research (1970) to gain an awareness of research in the quantity surveying and allied fields. The conclusions were that very little research was being undertaken. What work had been done or was in hand was seen to be principally in the United Kingdom and in countries where the quantity surveyor practices, notably Australia. Very little work was being undertaken in other European countries. The Institutes' second survey of research (1976) shows a similar situation. The two surveys have highlighted the need for further thinking and research in the field of building economics. To avoid any duplication of effort there must be a greater awareness of work being undertaken on this subject. If knowledge is to be increased, research work must not be confined to purely popular subjects but considerably widened in concept.

There exists much repetition. An example is the examination of estimating methods in the industry. This has been done by several people, first, possibly by Skoyles, then by Ferry, then by other people working on data co-ordination. More recently part of the work has been looked at again by the Standard Method of Measurement Development Unit. Such duplication usually stems from the failure of a research worker to respect or know about the previous work undertaken in a given field. Instead of extending the knowledge gained, or ascertaining that a dated study is still applicable, the work is often repeated, wasting limited research resources.

It is surprising to note how some research has never been contemplated until the quantity surveying profession had been established many years. Challenging the principles of measuring finished work in place is an example. The work stemmed from two other items of research work; the incompatibility of quantities with feedback of "site" costs and the greater role of pre-tender planning in the estimating process.

There are possibly three reasons why the precepts of measurement were not previously challenged. First, it did not become apparent to the clients until the post-war period that detailed financial resource control was important. Thus for many years there was no pressure on the profession to look wider for producing tendering and post-contract documentation.

Second, the profession, by its very nature, has been non-scientific and with poor academic standards. Pre the 1939–45 war the vast majority of surveyors received their training through the evening class and the articled pupil, strictly controlled by the dictates of professional examinations in preference to the opportunities of the post-war period offered in the sixties, through universities and polytechnic.

Thirdly, there was no incentive or opportunity for any person to undertake research. This situation is largely due to Quantity Surveying as an academic discipline being in its infancy.

It is hoped this paper will do something to ameliorate the position and to encourage more surveyors to come into research. Firstly, possibly as full-time workers (or by making worthwhile part-time contributions to the knowledge of the profession). Secondly, to encourage those who undertake higher degree by research, to disseminate their research findings more widely in the industry.

What is Research?

Research is a word freely used, often it is wrongly used to express an individual's uncorroborated opinion. What is this criteria of research, if any exists, and where does research end and normal enquiry and data collection begin?

Research is very much an open word and can be used to mean many things. Hence, the word can be used widely (and often insincerely) with objectives of self or gain for a corporate body in lieu solely for society at large. Thus one has to look to a definition as the base from which to construct a practical working definition.

The Oxford Dictionary definition is "Endeavour to discover facts by scientific study".

The object of research must be clearly seen as to eventually apply knowledge which is gained by scientific means of ascertaining facts. But to undertake research and fail to apply it in practice or hand over results of basic research for further study is not real research. This attitude does no credit to the few workers in this field who do not make every attempt, in spite of considerable opposition (particularly in the building industry), to get the results of their work accepted in practice.

Hence, advancement of knowledge (not the restating of the same facts, which comes well outside this field), is research if undertaken scientifically.

But, can research cover anything from the humble efforts of a student to the relatively large financial resources of Research Bodies? The author believes so, provided the objective is concerned with acquiring new knowledge based on factual examination. Obviously any work by a student is of value, provided it is an addition to knowledge, based on factual data and not opinion of a writer or of views of other people given to him. In this field the student is at a serious disadvantage for he often does not have the time (or money) to see that his work is original, although today in the building economics field he has some guidelines, e.g. The Survey of Research.[1]

Far too much energy is spent by undergraduates (and graduates for higher degree awards) writing theses which advance and enhance the knowledge of the industry no further because their field is limited or a repetition.

The Principles of Research

The use of the word scientific in the definition of research raises the question of a mystique in the techniques to be used and the disciplines capable of undertaking the work.

The principles of research can be described as twofold. Finding out facts, induction (usually based on a hypothesis). Secondly, having found the facts, to analyse them and come to logical conclusions. If the hypothesis is proven it is essential either to achieve its Application in practice or go on to further research work (or persuading others to do so), to learn more about the subject in greater detail.

When starting research it should be asked, "What is the objective of the proposed work, what facts have to be known before the work can commence, what is the method of carrying out the work. A knowledge of the little practical details can often be of great importance, particularly when undertaking research work in the construction industry, e.g. the relationships between the site manager and site worker which at times may be fraught with difficulties.

Within these principles the practices of research should be carried out in a scientific manner, namely using a systematic technique to formulate the new knowledge and in the pursuit of this new knowledge the facts must be compared, based on observation (of facts or experiment) to known existing facts (which can act as controls) and the deductions made must be dependent on self evident truths. Thus scientific research is no mystique but plain common sense of carefully and methodically making examinations and then drawing conclusions of real facts and excluding every form of feasible bias to the results.

Research should depend in a critical examination of a problem upon two things: the acceptance of all on the project of the common aim of getting at the truth, or at least nearer to the truth, than existing knowledge and the using of a considerable amount of background knowledge. This does not mean that either of these two points is an indispensable basis of every examination, or that these two things themselves are *a priori*[1], and cannot be critically examined intelligibly in isolation, It only means a criticism must start from some statement even though every one of its starting points may be challenged.

One of the facts which is characteristic of the background in which the research worker finds himself is that we constantly add to our background (or basic) knowledge. If we discard some part of it, others, closely related to it will remain. Hence the existence of this background knowledge plays an important role in all arguments which support any hypothesis. Thus the quantity surveyor need not be discouraged in competition with the scientist. In building economics it is he who has this background knowledge to do the work.

But even scientific principles are subject to query as one of them, Sir Karl Popper has postulated.[2]

A scientific research worker systematically records findings, the best, publish them (or most do if they seek prestige). Scientists who feel the need to learn more facts go on to do other research work and in the course of time the knowledge accumulates in special fields with a lot of shared and reliable data. As the data bank develops features begin to emerge and general hypothesis (or statements of the character, similar to laws in which all known facts are explained and related to each other are given) emerge while all scientists attempt to confirm hypothesis by finding evidence which will support it. They often do not succeed. It is justifiable research to produce a negated result but if a research worker in the field of physical sciences is successful he can then purport to have claimed another scientific law which will unlock more of the facts of life.

The method of basing general statements on observations related to specific instances is generally called induction. This is regarded as the basic principle of scientific research. The use of the inducted method is the criterion between science and non science. Thus scientific statements being based on observational experiments – i.e. constructed on facts which can be contrasted to statements of all other kinds.

It is an open question whether quantity surveying and building economics generally come into this field. The authors feel that it does for science is a statement of knowledge and the growth of this knowledge consists of an endless process of adding new certainties to the bodies of existing ones and

there is much in the field of economics for this.

However, when science is considered, one usually thinks of the laws of physics which are themselves general statements which are not always logically entailed by general instances.

Popper's philosophy that all measurement whether of time or space can only be with a certain degree of accuracy is ideal for the situation of building economics where the laws of physics are less applicable. In building economics one is dealing with a series of imponderable facts which come from often a lot of questionable data and work in this field does much to increase the knowledge but so many things are questionable in it and of these, most of all, is the data base.

Examining the Data Collected

The various types of research can be clearly seen under three headings. Each has a different purpose and while the third may not be seen as true research, it really is, as it is often an essential part of Application of research.

Basic Research

Much knowledge is often of a primary nature which solely leads to future work and is a long way from practical application. The basic knowledge of characteristics of cement and the ever searching for more knowledge is a long way from failures of high alumina cement. Nevertheless much of this basic research contributed to the knowledge of the product which helped in the later stages to understand the properties (and new methods of manufacture) of the product range.

In the building economics field, work which has contributed much to the industry's thinking like the Operational Approach studies, or the specialised labour studies, like the A.M.H.C. Report[3] have been basic research. They both (like several other pieces of research) have started new fields of knowledge and paved the way for future concepts in thinking. Basic research does not have the constraints detailed by application and leaves the subject area open to the widest thought and hypotheses.

Applied Research

When more knowledge is needed after basic research which leads directly to Application and the practical problems have to be considered, dictates are placed on the whole field and practicabilities of the given existing situation have to be considered. This is where applied research is so distinctly different to basic research, by the dictates of practical instructions which have to be considered. However, in spite of these limitations – the work is distinctly research with the philosophy of hypotheses, induction and examination. It is the dictate of a given situation (in lieu of complete freedom of thought) which is the difference. Thus developing the Operational Approach into Activity and Method Related bills – was applied, research – like the development of the A.M.H.C. principles of study into Activity Sampling technique studies. Applied research always comes after basic research but sometimes in the use of simple problems basic research is not necessary.

Development Work

Once research is completed, further thought and enquiry not along scientific lines is necessary – this is solely development work. The live trials, the final testing when it is essential to keep to established principles but often make considerable changes to meet the dictates of practice all come within this category.

Motivation to start Research Work

This choice depends very much on what is required by the person – a full-time career on the subject, a part-time career, where the other part can be academic, of part of one's overall career, i.e. undertaken as a sabatical, taking a course at a university and part-time. For higher degrees the work is usually undertaken by the student to obtain academic distinction. The sole objective should be to "make a significant contribution to knowledge", but in selecting a research subject lies two extremes.

On one hand where there is an extensive background of earlier work in a field and with it the lines of thinking may be fairly clear, the researcher may have problems in ascertaining what has already been done and what new contributions he can make to this field. If he does have a clear idea of the contribution he can make but he finds by pilot work he has nothing new to offer another field should be sought. When a thesis is to be undertaken within this framework it needs a very clear introduction with concise references to the other work and how the thesis adds to this knowledge.

At the other end of work there is a type of project which is seeking new ground and for which very few references, if any, exist.

Generally speaking dissertations solely prove the writers can examine facts, etc. However, with a little forethought and help from experienced tutors very useful mini research projects could be produced by these students.

Where to do Research

In theory anyone can do research work, even at home in isolation to academic life but it is advised before research can be undertaken a base is needed. While for one person this may be to seek a higher degree – so they look to a University or Polytechnic, for those who want to do full-time research it means to seek a job in a research institution, either full-time or on a period of secondment. Whatever the base – it is essential to have access to a library. For making contacts to the various people and authorities who may be asked to grant facilities or make data available for the research work it is also essential. A reliable background which is reputable also guarantees that facilities offered the researcher will not be abused and the co-operation has a creditable purpose. Second, as some research work means making contacts to obtain data, this help is more likely to be given when the work is under the auspices of a recognised institution. This usually offers the opportunity to share views with other more experienced research workers, which is advisable, too.

While the volunteer can do research on their own it is fraught with many problems which a sound base can overcome and it is not advised.

For those who wish to do part-time research it is best to seek the support (even if not financially) of their learned society (or if they are unqualified but very keen) the local technical college. This is possibly where the quantity surveyor has a big part to play. So many people in building research have little knowledge and experience of the basic industry which they are researching. Often they undertake research to "given" subjects, which clients' want them to investigate and do not themselves know at first hand the defects of any system or where greater knowledge is required and they can maybe help. Hence, defining the area of work is of great importance and this in the field of quantity surveying can cover many things.

Selecting the area of work

First, while one has either to have ideas or know someone

who has ideas you wish to study further. Thus ideas for a subject can come from an area of practice which needs investigation whether to test existing principles, to ameliorate a weakness in practice or most common of all to solve a problem – which may be known but not definable.

On the other hand, someone wishing to do research may seek ideas themselves, by seeing areas needing research after examining existing work in progress or completed and noted as in the Institute's Survey. Some people who lack basic incentive often write to learned societies asking them to suggest ideas.

At the early stage of a project, considerable enquiry, much often abortive, may be necessary to establish the area and subject of research, e.g. many problems may seem to be imponderable and need re-analysing into small units of work to achieve a greater understanding of how to tackle the problem.

Having established the research area, the needs of the project should be considered.

A great danger exists to the inexperienced to tackle a subject which is too vast for their resources. Thus, the area of research if it is to be useful in general terms, must have defined boundaries and be manageable for the person or team to undertake.

Defining the project requires considerable thought. At this stage it is best to retire and think for some time what is the objective to be achieved and what are the benefits and how can they be applied. Having established the research criteria a research methodology is produced. It is often advisable to undertake an initial pilot study.

Before proceeding further one should ask where is the knowledge needed. Generally speaking this is right across the whole field of building economics. But when the current Survey of Research is examined, it is found that much more research is centred on single issues and there are sectors of building economics which are completely uncovered.

Generally research can be categorised under the ten headings of the I.Q.S. Survey of Research, which are:

1. Legal Procedures
   - 1.1 Pre Tender
   - 1.2 Post Tender
2. Measurement Practice
   - 2.1 Pre Tender
   - 2.2 Tender
   - 2.3 Post Tender
3. Communications
   - 3.1 Client and Design Team
   - 3.2 Design Team to Contractor
   - 3.3 Inter-Construction Team
4. Building Economics
   - 4.1 Design Cost Planning
   - 4.2 Cost in Use
   - 4.3 Design Costs Criteria
5. Estimating
   - 5.1 Approximate Estimating
   - 5.2 Pricing Techniques
6. Performance Evaluation
   - 6.1 Materials
   - 6.2 Labour
   - 6.3 Plant
7. Contractors Costing
8. Computer Techniques
9. Management Theory and Practice
10. Technological Innovation

The choice of subject area requires a great deal of thought for a higher degree and a discussion is advised in the early stages with someone who is familiar at the in depth level of it within the industry. Even if the work involves the preparation of a dissertation in partial fulfilment of the higher degree it is essential that the project should be well defined and should add to the body of knowledge in a subject area.

Final Preparations to Start the Research

After the pilot study before research work is commenced some organised statement should be made concerning who is to undertake the research, what monies will be available, what computer time and what other supporting services are necessary; what are the objectives, what is the methodology to be used, and above all what are the benefits. Most research institutions have recognised pro-formas for investigating the work at the early stage, much time is spent vetting projects. This does save considerable energies because a well vetted project seldom becomes abortive work later. It should also be asked what is the relationship to other work.

Planning the Work

The master plan

Having defined the project and decided to start work it is essential to make a master plan. The stages of work are described as follows:

(*a*) Induction – finding out the facts and collecting the data.
(*b*) Analysing the data.
(*c*) Drawing the conclusions.
(*d*) Dissemination of the results.

It is not a question of dividing the work into stages – meeting each as it comes – but of considering first in outline how each stage is to be tackled and what the data is likely to look like. What type of facts are to be collected, how is the work to be collated – manually – or using a computer; what will the report look like. Much thought and preplanning is essential. In most research the plan is seldom sequential and has the most complicated interactions, e.g. collation will be progressing at the same time as induction, and in the case of practical studies pre-analysis of certain facts is often desirable because collaborating bodies need stimulation to continue their support. In many studies some early analysis is necessary to ensure that the hypothesis needs no reorientation. The essential point is that a few headings always exist even if they are not clearly and separately identifiable.

Any research project should be based on some hypothesis – one must not go "charging" into an area of the unknown with no preconceived ideas. It is these ideas which are the basis of the hypothesis and the objective is to test them and draw conclusions.

Hence, most research workers are people with ideas they want to test. All research involves careful thought developing ideas – which can take weeks, months or even years to conceive. When the ideas are clearly seen, a statement (or series of them) has to be examined to test them. The opportunity may not always exist to undertake the research at the time of forming a provisional hypothesis.

(a) *Induction (or finding out the facts)*

This is the crux of research. Several questions have to be asked and answered to plan the induction. What facts are to be examined? Where are they to be found when the facts are examined? Will they be acceptable or subject to rejection? At its simplest level only one set of facts will be examined, and this may be the case in a simple piece of work. The

majority of work is more complex and several facts and stages of induction will be necessary.

First, what data has to be seen for the facts to be found which are comparable? To what existing facts are they to be compared because they must be related to something known (even if this is accepted as hypothetical, i.e. a norm used in practice)? This itself is often difficult and in every case where things are not comparable a note should be made with an explanation of the deviation.

Second, facts must be tangible, logical and statements of evidence of truth, not opinion. The major mistake in gathering opinion – usually in building it is done by accepting this "evidence" from already biased people. A protagonist or committed practitioner can be biased.

Thirdly, they must be manageable and statistically realistic.

(b) *Analysing the results*

One of the features of analysing results is that it must be undertaken on a logical basis and any bias of the worker is removed from the answers. It is so easy to draw hasty conclusions.

It is essential to check that facts have been correctly collected and no vague (or rogue) results are included. This is particularly necessary in site observation type studies. If some of the facts are apparently correct but in the wrong format it is advisable to correct the observers' returns – attaching the queried and amended formats to the new ones. It is necessary to collate in manageable units too.

Having collated the results they should now be analysed. For this statistical techniques are advised. The use of statistical techniques is becoming increasingly important in all fields. The usefulness of any statistical analysis depends entirely upon the confidence of those who are attempting to interpret the responses which are being examined. Statistics is such an immense field that it is impossible to give anything but a passing reference to its philosophy. (See the Bibliography.)

It is useful to remember that statistics have different meanings for different people. To many people it means tables and figures, perhaps in the terms of accident quotients or other statistics about life. To others, statements of data which need an experienced analyst to interpret their value to a given problem. Statistics can be applied to any kind of factual information given in terms of numbers. The subject itself is a whole field of knowledge of its own.

For the purposes of research the two kinds of statistics are of most value. Integral (usually described as the science of making decisions in the face of uncertainty) and descriptive (usually describing data). The former is mainly used. Using statistics have little value unless they can be presented in tangible terms for comparison in order that notional analysis can be made and the conclusions clearly proven in any report. Hence the pictorial presentation of data is very important too. A knowledge of basic statistics is essential for research to ensure facts are not interpreted wrongly.

(c) *Drawing conclusions*

It is a recognised statement that any point can be proved or disproved by a lucid argument. The conclusions to any research need care, assessment and a detachment to examine and argue them from every view. The writer should lead the reader to see his point and every facet must be meticulously examined. Where facts are not completed or leave further questions to be asked it must be noted and clearly stated.

(d) *Application of research*

Application is particularly difficult in a conservative industry like building and tireless energy is often required.

Application of research is essential and can be done in many ways. First there is obviously the question of disseminating the report(s) but the first reports on any research work tend to be academic and at far too detailed a level for a busy person in the building industry to read. Hence, apart from the first report (or even the thesis) more readable and concise "conspectus like papers" are necessary and the technical press are usually pleased to receive them. But the papers should be aimed at a definite audience, i.e. the architect or the quantity surveyor or the industry at large.

The next formal application is by lecturing, this requires very careful preparation and should papers be "read" these are always badly received by the audience and it is only the skilled who can manage to read a paper to a meeting with any success. Most lecturers with experience never read papers, unless it is a more formalised presentation.

And last, but as important, a method of Application, is on the face-to-face, person-to-person level, for explaining the work at a practical level of detail.

Writing the report

First the matter is discussed, generally with the writing of reports for publication, secondly special references follow dealing with Theses and Dissertations.

(a) *Reports for publication*

One of the difficulties of presenting a report is to convey concisely and precisely to the reader the results of the study. This is usually in the form of a paper published in a technical or scientific journal.

In a complex industry like building it must be asked who is the audience? For the more general research the readers can vary from a quantity surveyor to a bricklayer. Obviously the accent on technicality and presentation has to consider each field of interest. Accepted words can be used for the quantity surveyor which to another discipline or trade, have to be carefully spelt out. Also, while a quantity surveyor may enjoy seeing an example if a new format in bills is being postulated – this is a pointless illustration for architects or bricklayers.

After the reader issue has been decided (and for major research work several reports may be required to cover the field), the writer should retire to the "think tank" to consider what the completed paper will contain – making very rough notes of the layout from which a broad synopsis can be drafted, around which the paper should be built.

The paper should start by introducing the subject, go on to discussing the background to the study. It is necessary then to describe the data studied and explain how the results were obtained and last but certainly not least the Conclusions. When the paper is written one more point has to be added – a summary to start it. This should be a conspectus from which key words could be extracted for referencing.

The title should now be added – not as the first words but as the last for many a paper which has started with one title has finished with another even if only one or two words have been changed. When more than one author is engaged due credit should be given.

However, the leader of the project should always have his name first.

(b) *Writing and organisation of the thesis or dissertation*

(i) Theses

These require a slightly different approach to papers for publication. The first move when starting the actual research work is to plan the structure of the thesis by headings, subheadings and chapters. (This is a similar procedure used by research workers when they write a paper.) It is advisable to

start the drafting of a thesis in outline at a very early stage, long before the results have been collated. This procedure (which is not usually followed by regular research institutes, where more experienced staff are available) allows the candidate to think carefully about the presentation and also criticise his own work and to develop the theory of the experimental side of his project. It is not necessary to write a full introduction at this stage.

The thesis can then be organised as follows: First, the theoretical side – or devising the hypothesis. Second, the experimental or data collection stage (when ideas of the draft are developed too). Third, the computation or analysis stage. Fourth, the presentation of the thesis in the form of a written report.

The organisation of any submission of this nature requires considerable thought and certain rules have to be observed:

1. Each part should only include statements relevant to its heading.
2. Reference to facts in other chapters should be made when applicable by specific references to the appropriate section or illustration. Thus repetitions are avoided and the examiners' attention is not distracted away from the logical sequence of events.
3. The division of each chapter into sections, paragraphs and sentences etc., should run in a series with each other and should not overlap.
4. Facts which are not central to the issue, other unverified postulations etc., should be avoided. Possibly the most important part is arranging the work in a logical manner.

(ii) Dissertations

The preparation of a dissertation is a most important exercise and provides the opportunity for the student to demonstrate certain skills:

1. To co-ordinate and integrate knowledge of several related subjects by application to a problem.
2. Emphasise the importance of correctly interpreting facts involved in a problem
3. To develop himself, particularly by initiative, in presentation of a problem and also justifying statements from his own judgment.
4. To develop his critical aptitudes.
5. To compile and present realistic and effective data.

In the opinion of the author many students are poorly advised on how to write their dissertations and by far the majority, leave the preparation of this document until the last moments of their academic year.

Preparing the lecture

It is essential that a lecture should be understood. It is no point giving any lecture which is rapidly forgotten by those who have attended it and the object of the lecture must be to transfer knowledge. To achieve this, points have to be made convincingly and the lecture has to be in such terms that people remember it.

When preparing a lecture it is essential to first look upon the lecture like a technical paper. Presenting everything in a logical sequence with the exception that the summary comes at the end when a "recap" is briefly given before the final sharp closure. It is important for the audience to know when the talk is over – often this simple part can be lost due to a mumbled final sentence.

To arrive for the lecture at the last minute has many disadvantages. It is necessary to settle down to make sure that all supporting equipment is in working order, that the slides, if they are to be handled by a projectionist are clearly marked and to check everyone present can see any demonstrations, slides, etc., from whatever seat they sit in. Noisy fans or opened windows and dress are worth checking at this point.

It is also useful to have a word with the Chairman to make sure a proper introduction is made. Of paramount importance, it is essential and start in a relaxed mood.

For public lectures it is essential to agree with the Chairman and keep to a proper time scale. The lecturer who is asked for sixty minutes and talks for an hour and a quarter is unlikely to be invited again and is likely to bore the audience. Likewise, a lecturer who is invited to speak for sixty minutes and drys up after forty-five is not fulfilling his function. Hence it should be clearly established how long a lecture is to last, including outline planning the meeting, introduction and discussion, the time allowed for preparing the talk before the meeting and presenting it.

The first five minutes of a lecture are important for capturing the audience's attention. The ending of a lecture should be crisp and to the point and the task of putting in a concise and succinct manner that the audience can clearly understand is important.

Face-to-face Discussion

One of the obstacles to change is to secure the influence on the industry. It is essential, particularly for full-time or higher degree research, to spend time trying to personally influence people. This may be to a company to try and persuade them to use a technique, a government department to adopt new methodology or even a professor to teach the facts to his college. The list is endless and time usually restricts those who are seen or can be seen. Such discussions should, therefore, be very much to the point, supported by *aide-mémoires* and brevity and clarity is essential.

Conclusion

Everyone is needed on research into building economics, but – the efforts must all be good-quality research (which needs organising) and unsubstantiated opinion so freely given as research is not research and should be avoided. Moreover, the research must be in the areas needed to have the utmost value and putting "old wine in new bottles" with the same hypothesis is not research.

The crux of research is forward thinking and proving by demonstration. These even concern principles which must re-examine the profession for the future.

Research is not getting new facts alone, once the points are proven, it is the duty of every research worker to Apply them.

The role of the quantity surveyor in research can be tremendous if he takes the chance, for there is much to learn, particularly in the field of pre-tender and post-tender accounts. The whole field lies open to the enthusiastic – in all areas – it is up to you, the reader, to accept the challenge.

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CONFERENCES AND COURSES

THE CHARTERED INSTITUTE OF ARBITRATORS

Two Day Course — The Giving of Expert Evidence

A two-day course designed to assist members of all professions who may be called upon to give expert evidence is to be held by the Chartered Institute of Arbitrators at the Royal Festival Hall, London on Monday, 14th May and Tuesday, 15th May, 1979. The course will include demonstrations, tutorials and lectures. Details from B. T. E. Humphrey, Assistant Secretary, The Chartered Institute of Arbitrators, 75 Cannon Street, London EC4N 5BH (Tel: 01-236 8761).

ADMINISTRATIVE STAFF COLLEGE

Part-time Masters' Degree in Management Studies

In October 1979 Brunel University, in conjunction with the Administrative Staff College, Henley, is launching a new part-time Masters' Degree Course in Management Studies. This course will be of particular interest to younger members with an interest in increasing their competence and qualifications. Attendance will be one day per week at Brunel University, Uxbridge, for three terms in each of two academic years. Details are available from Dr. D. W. Birchall, Administrative Staff College, Greenlands, Henley, Oxon. Tel: 049-166 454.

COLLEGE OF ESTATE MANAGEMENT

Courses in Arbitration

The College of Estate Management offers a correspondence course, arranged in consultation with the Institute of Arbitrators, for professional people who may be invited to act as arbitrators or as expert witnesses at arbitrations. The course is suitable for those preparing for the examinations of the Institute of Arbitrators and also forms a useful work of reference for all those concerned with arbitrations. For details contact the Director of Courses, Room A, College of Estate Management, Whiteknights, Reading RG6 2AW. Tel: 0734 861101.

TRENT POLYTECHNIC

Short Course – SMM6

A short course on Measurement – The Sixth Edition of the Standard Method of Measurement of Building Works will be held at Trent Polytechnic on Thursday evenings of the weeks 3rd May to 24th May from 7 to 9 p.m. The fee will be £8.20 inclusive of VAT and Polytechnic registration fee. For further details and application form please contact F. Bradbury, ARICS, Principal Lecturer, Department of Surveying, Trent Polytechnic, Burton Street, Nottingham NG1 4BU. Tel: 0602 48248, Ext. 2517.

Practice and Parliamentary

PRACTICE NOTES

The Undertaker is Often Late

The article "Suffering the Undertakers" (J. R. Humber) in this edition of *The Quantity Surveyor* and information received by the Institute from other quarters suggest that there is widespread and growing concern among those who are adversely affected by delays said to be caused by statutory undertakers. Such delays appear to be mainly in two categories; (*a*) the hold-up of new developments by the time taken to agree acceptable arrangements with one or more statutory authorities regarding the extension of and/or connection to existing drainage and other systems such as water, gas, electricity and telephone services; and (*b*) delays to construction works caused by the act or neglect of statutory authorities engaged to perform or provide works/services which would otherwise be the subject of nominated sub-contracts.

Members who can supply information, comments and/or suggestions (albeit on a personal and confidential basis) are invited to get in touch with the Professional Services Officer at Headquarters.

Public Works: Audit of Final Accounts

Some interesting views and comments have been received from members in response to the Practice Note in the December 1978 edition. These have been referred to a working-party set up by the Professional Practice Board to examine and report as soon as possible on the current position. Any further submissions which members may wish to make should be sent to Headquarters not later than 30 April.