SCHOOL OF ARCHITECTURE & CONSTRUCTION

DISSERTATION HANDBOOK
Course Code: BUIL0015

Undergraduate Portfolio –
Construction & Property Programmes.

2009-2010

the UNIVERSITY of GREENWICH

It is the intention of the University of keep under review the content, teaching method and assessment of all its programmes and in consequence there may be changes which have overtaken the production of this document, or indeed, which may occur during the course of the year.

Issued by: Dr G H Bull, Dissertation Co-ordinator

TIMETABLE

Key Dates	Action Required
	Year 3 Full Time, Year 5 Part Time
Terms 1 and 2	Students will be allocated a weekly tutorial group at the start of their final academic year. The groups are usually determined by Programme and FT/PT status. Initially, these groups will comprise a number of tutors, and depending on your chosen subject you will be allocated an individual tutor from within this group during the course of term 1. In order to facilitate this process, students will be required to submit their title by a set date (normally week 5). After this point, and once an individual tutor has been allocated, supervision will increasingly take place on an individual basis. Information on groups, rooms and individual tutors will be placed on the noticeboard outside the school office at the start of term. It is important that you attend these tutorials on a regular basis. Students repeating the dissertation are also required to reattend these introductory tutorials and may be required to change topic/tutor. The introduction to the course consists of a series of lectures and workshops. In term 2 supervision takes place through meetings with your individual tutor. By mid-November, Term 1.9, you should have produced a dissertation outline with chapter headings. The outline should also include sections on the aims and objectives, the proposed methodology and further reading/sources. The identification of clear-cut aims and objectives is essential for the success of the final dissertation, particularly since well-argued conclusions must be drawn from the analysis. There is a workshop presentation at the end of term 1. This accounts for 5% of the overall marks for the dissertation.
Term 3	Dissertations (1copy*, typed and bound) must be handed in to the School Office by the set date. A good quality hardback or 'perfect' binding should be used, conforming with the dissertation binding format. Students must retain an additional hard copy . *The University reserves the right to retain this copy and a few may be retained each year. However in most cases, and as a rule, students should arrange to collect their dissertation as soon as possible after their results.

Please note:

It is a requirement of the University of Greenwich that students must register for courses being undertaken. This also applies to students who are deferred or referred in the Dissertation. Dissertation submissions will not be accepted from students who have not registered. You should also note that under the regulations, dissertations may not be assessed when students have failed to attend or contact their tutor. In this case a zero mark may be entered.

COURSE DEFINITION

Course Code:	**BUIL 0015**	**School: Architecture and Construction**
Course Title:	**DISSERTATION**	**Course Co-ordinator: Dr Gregory Bull**
Level: 3	**Credit: 30**	**Teams: CM/PHUR**

Introduction and Rationale:

The dissertation represents the culmination of each individual student's development through the learning undertaken on their respective programme. It provides an opportunity for students to demonstrate their ability to undertake a substantial study in order to investigate a subject, issue, or problem and produce a definitive usable outcome.

The dissertation will require students to demonstrate their analytical, deductive, investigative, critical and written communication skills in relation to their chosen subject, issue or problem. The dissertation will require students to use the wide range of skills that they have developed during the programme, such as enterprise, initiative and resourcefulness; self-motivation and time management; synthesise and integration of complex data and information, together with the organisational skills required to produce a substantive piece of written work.

Aims:

The aims of this Course are to:

(a) provide students with an opportunity to carry out a substantial critical, in-depth study in a subject area of particular interest to the student;

(b) introduce students to investigation, research, analysis, synthesis and other techniques to gather process and present usable information.

(c) enable students to develop a particular area of expertise for use in their future professional career.

Learning Outcomes:

Upon completion of this Course, students will be able to:

(a) demonstrate initiative and discrimination in the sourcing and selection of material.

(b) undertake critical reading skills and critical analysis of material.

(c) integrate data and knowledge and synthesise complex information.

(d) organise and structure a substantial piece of work.

(e) produce a clearly defined and usable outcome within a specified timescale.

(f) demonstrate a level of expert knowledge in a particular subject or issue.

(g) manage their own efforts effectively.

At the end of the successful completion of the course the student will have completed a submission in accordance with the course and thus fulfilled the aims outlined above.

Main Learning and Teaching Activities:

Introductory lectures/seminars.

Consultations with personal dissertation supervisor.

Assessment Criteria

Assessment 1

1. End of term visual/verbal presentation 5%

Assessment 2

2. Clear statement of purpose, objectives and sub-objectives for the study. 5%

3. Logical and workable method to achieve the stated objectives. 5%

4. Scope, depth and quality of the information, data and material used. 30%

5. Quality of the contents/findings and expertise demonstrated in the study. 30%

6. Extent to which the stated objectives have been achieved 10%

7. Quality of the structure, presentation and usability of the study 10%

Assessment 3

8. Process and preparation 5%

Totals

Assessment Details:

Methods of Assessment	Word Length	Weighting %	Outline Details
Assignment 1	N/A	5%	Visual/Verbal Presentation
Assignment 2	10,000 (max)	90%	Written Dissertation
Assignment 3	N/A	5%	Process and Preparation

Key Texts:

ISBN Number	Author	Date	Title	Publisher
0335-19094-4	Cooper, B. Bell J	2004	Writing Reports 'Doing Your Research Project'	Penguin Open University
075062906	Naoum, S.	2005	'Dissertation Research and Writing for Construction Students'	Butterworth-Heinemann
0582803128	Lindsay, D.	1997	'A Guide to Scientific Writing'	Longman

Undergraduate Dissertation Marking Scheme

STUDENT…….. **Programme…….**	**COMMENTS**	**% of Mark**	**Tutor name**	**Examiner name**	**Agreed Mark/ Third Mark***
Assessment 1 End of term visual/verbal presentation		5%			
Assessment 2 1. Clear statement of purpose, aims, objectives and sub-objectives for the study.		5%			
2. Logical and workable method to achieve the stated objectives.		5%			
3. Scope, depth and quality of the information, data and material used.		30%			
4. Quality of the contents/findings and expertise demonstrated in the study.		30%			
5. Extent to which the stated objectives have been achieved and usability of the study		10%			
6. Quality of the structure, presentation and referencing.		10%			
Assessment 3 Process and preparation		5%			
Totals		**100%**			

*Agreed mark – this column to be completed by tutor following discussion with examiner. In the event of a difference of 10% points or more, a third marker is required.

LATE SUBMISSIONS NOT GRANTED AN EXTENSION WILL BE RECORDED AS A 'FAIL'

Marking Scheme Guide

Itemised Rating Scale

	Strong **Weak** 	
1. Clear and informative definition of the aims and objectives of the research or study topic/problem to be investigated		Weak and cursory description of research topic/problem to be investigated.
2. Clear and coherent identification of how the study is to be undertaken and the intended research techniques		Poorly developed description of intended techniques, to achieve stated aims and objectives.
3. Extensive, appropriate and in-depth selection of materials, properly referenced. Ability to synthesise complex information, to identify relevant issues and to provide an in-depth discussion and summary of such materials.		Narrow, limited and/or inappropriate selection of materials, showing little evidence of ability to draw out and analyse the relevant issues, and/or an inability to deal with complex information.
4. Good analysis and presentation of the information gathered in the study, demonstrating comprehensive scope of the subject and in-depth insight and mastery of the subject.		Limited scope and depth of information. Misused analysis and unstructured presentation. Superficial understanding and mastery of the subject.
5. Effective and comprehensive achievement of the objectives and /or hypothesis.		Little/no achievement of the objectives and/or hypothesis.
6. Clear, logical and succinct writing style with good use of English. Good structure and organisation of work. Good quality of figures/tables, etc. and adherence to required word length		Clumsy expression, repetitive, under /over length paragraphs/ sentences. Ungrammatical sentences, much incorrect spelling, untidy, difficult to read. Poor quality figures/tables etc. Under/over length

Below is a summary guide to assessment bands based on the qualities defined in section 4. Each assessment band builds on the qualities exhibited in the band below it.

70%+ - Substantially integrative and analytical with considerable insight
A thorough understanding of the subject with a high degree of critical analysis, a highly developed understanding of the consequences of actions; soundly constructed conclusions and recommendations, a well organised structure and highly effective presentation, with a considerable degree of perceptive insight and creativity.

60%-69% - Substantially integrative and analytical
A thorough understanding of the subject with a considerable degree of critical analysis. A developed understanding of the integration between discipline and the consequences of actions, soundly constructed conclusions and recommendations; a well organised structure and effective presentation, with a degree of perceptive insight and creativity.

50%-59% - Reasonable integrative and analytical.
A good understanding of the subject with a satisfactory degree of critical analysis; an awareness of the integration between disciplines and the consequences of actions; reasonably organised structure and presentation. Some degree of insight or creativity.

40%-49% - Basically descriptive
A basic comprehension of the subject with a limited amount of analysis. Adequate conclusions and recommendations, albeit with only a limited awareness of the consequences of action, a fair organisation of structure and fair presentation. Little, if any, insight or creativity.

UNDERGRADUATE DISSERTATION : SUPERVISION RECORD

Student:…… Staff:……

Dissertation:…….

Process and Preparation (5% of total marks) Workshop presentation (5% of total marks)

Term Week	**Comments and Action**	**Comments**
1 4/5	1. Objective: Define problem and area of study	
1	2. Objective: Identify and review articles and sources	
1	3. Objective: Identify aims / objectives	
1	4. Objective: Discuss research methods/structure of dissertation	
1 10/11	5. Workshop presentation/discussion of proposals (including proposed work plan) - 5% of total mark	
Term 2	6. Tutors may set other objectives, e.g. - programme for completion of dissertation - acquire additional skills in research - discuss questionnaire analysis	
2	7. Discussion of results/conclusions	
	8. Process and Preparation mark – 5% of total mark	
	Overall assessed Mark /10 =	

NOTE: Objectives 1-4 correspond to the suggested structure for Chapter 1. These objectives should therefore be met by the end of November (Term 1, weeks 9-11 at the latest)

School of Architecture & Construction

Programme/
Degree Title:……

Year:……

PT/FT:…….

FAMILY NAME: **FORENAME(s)**

PROPOSED DISSERTATION TITLE*

Max. 15 Words

To be returned to your class tutor by Week 5.

*If you change your draft title please complete the form on page 13 and ask your tutor to amend his/her records.

the UNIVERSITY of GREENWICH

To be handed to tutor by student during tutorial meeting by week 9.

FAMILY NAME:

FORENAME(s):

PROGRAMME:

DISSERTATION TITLE:

AIMS & OBJECTIVES:

METHODOLOGY:

READING / SOURCES:

School of Architecture & Construction

In case you decide to change the draft title of your dissertation, please send this form to your tutor.

FAMILY NAME:

FORENAMES(s):

NEW TITLE:

SIGNATURE OF TUTOR:

the UNIVERSITY of GREENWICH

SOME POINTS TO BEAR IN MIND

The Topic
It should be a problem or issue that requires a solution (but don't expect to produce the definitive solution). Try to avoid topics which are too general. The subject area should be of general relevance to the study of the environment/built environment. Your initial research should identify the main sources of information available on your chosen topic (e.g. articles, reports, books etc.)

The Dissertation Outline and Research
The problem or issue should guide your reading. Document all sources of information, articles, etc. as you go.

Make sure information collecting, questionnaires or surveys *are* possible (discuss structure and research proposals with your Tutor).

Further Research
There is an interactive process of refining the issue and collecting further information and reading.

Writing, Organisation and Presentation
Write simply (but not chatty) and explain clearly, in your own words.

Think about chapter headings …. make sure you know in advance what is involved in each chapter.

Choose a reference system which suits your needs and make sure all quotes, etc., are referenced in the text (see page 18).

Proper use of annexes, tables, etc., is important. Keep important information in the main text, but background information is often better in an appendix.

Keep to the word limit (see presentation guidelines). If your tutor thinks you are over the limit you will be requested to provide a word count. Excess length may attract penalty marks. (You have been warned!)

Leave time for typing, proof reading, binding, etc.

Suggested Reading

R. Berry	*'The Research Project and how to write it'*	Routledge, 2000
J. Bell	*'Doing Your Research Project'*	Open University, 2004
D. Lindsay	*'A Guide to Scientific Writing'*	Longman, 1997
S. Naoum	*'Dissertation Research and Writing'*	Butterworth-Heinemann, 2005

RESEARCH METHODOLOGY

There are at least FOUR different ways to doing a research project:

i) CASE STUDY

a) Formulate a number of questions:

Examples:
Preconditions for success and failure of large projects – then apply to a large project.

b) A case study must follow on form substantive criteria – therefore a case study is not plucked out of the air!

ii) EMPIRICAL STUDY

Build a research model, test out the model and then evaluate its strengths and weaknesses – identifying the limitations of the model.

Examples:
'New standards of fitness under the 1989 Housing Act'.

In this examples, the study could take a group of buildings in order to check out the economic consequences of the old 12 point standard as compared to the new standards of fitness in terms of expenditure.

(see Appendix 2 for further details on models).

iii) LABORATORY TEST

Build a laboratory test (model or full size) and apply the necessary criteria to obtain a test result.

Use a theory to analytically model the test, and then compare the test and theory.

Critically assess both the test and the theory.
(see Appendix 2)

iv) LITERATURE REVIEW

Example
'Urban decay and renewal strategies in the UK'

Key to review: comprehensive and critical.

DISSERTATION – PRESENTATION GUIDELINES FOR TUTORS/STUDENTS

Many of the points detailed below may seem fairly trivial but if they are closely observed the Dissertation report can be produced and comprehended with greater ease. You are strongly recommended to follow these guidelines.

Text
The text should be in chapters, chapter one providing the introduction, and the final chapter giving your conclusions. The introduction should make clear the aims and objectives of the study and state clearly any hypotheses to be tested. It should also include a description of the methodology to be employed. In some instances it may be necessary to devote a whole chapter to methodology. The Dissertation (including quotations, tables, Appendix and References) should be typed, double space and on one side only of a good quality A4 paper of the same format. Please leave ample margins and indent the beginning of paragraphs in the usual way. The pages should be numbered consecutively.

The main body of the undergraduate dissertation should be between 8,000 - 10,000 words (excluding preliminary and end material and tables). Four or five chapters or major sections are recommended including an introduction. The Dissertation should be bound using hard or 'perfect' binding (see binding format page 16). Please refer to the **Oxford English Dictionary** and carefully check the typed end product. There is no excuse for incorrect spelling. For any particular problems of grammar, usage, etc., such works as Fowler's Modern English Usage should be consulted.

Preliminary and End Material
The Dissertation should incorporate the following:

- Title page*
- Abstract
- Acknowledgements
- Contents Page
- List of figures
- List of tables
- List of abbreviations (if any)
- Text (and conclusions)
- References
- Appendices

(*This must include statement mentioned on page 14).

Figures, Tables, Appendices and References
All graphics (Maps, photographs, drawings, graphs, pie charts, histograms, etc.) should be labelled **Figure** (1.1, 1.2.1.3, 2.1, 2.2, etc) and captioned below the presentation showing sources as appropriate.

Figures and tables and drawings/photographs should not stand alone and certainly should not be included for decorative reasons only. References must be made to them in the text, e.g. (see Figure 3.6) or (See Table 2.5).

Plagiarism
Plagiarism as a form of cheating takes place when the student uses information (in the form of data, results, or text) from a source which is not acknowledged. It is totally unacceptable in any academic work and any student found committing such an offence will face very serious consequences.

The Dissertation shall include at the bottom of the title pages the following declaration;
'Except where stated otherwise, this Dissertation is based entirely on the author's own work'.

Matter which has been included in a successful submission for a degree or other qualification of any university or professional or learned body must not be embodied in any dissertation submitted under the regulations for an undergraduate degree. The Dissertation must conform with the guidelines on the following pages. One bound copy of the Dissertation must be submitted and this may be retained by the School.

Although the Dissertation remains the intellectual property of the student, the copyright is shared between the student and the University of Greenwich.

Use of Libraries
You are encouraged to undertake an extensive bibliographical search for materials (books, articles, etc.) in your chosen area before starting to write (see Librarian(s) if you need help).

Research Ethics
Under the University Regulations undergraduate and taught postgraduate projects involving human subjects require prior approval from the Head of School.

An appendix can usefully contain additional data, a brief discussion of topics which are not central to the argument of the Dissertation but which have strong relevance to it, or amplification of some of the points only briefly discussed in the text. The appendix should not be used to effectively extend the word length of the main body of the dissertation.

The Reference section should contain only those references made in the text. Additional published materials read in the preparation of the Dissertation should not be included.

Authors should be listed in alphabetical order (if the Harvard system is used), but if the superior number system is employed, references should be shown in numerical order on a chapter by chapter basis (see below).

Reference Systems
You must reference your work correctly. Several systems exist and the choice is normally a matter of preference and style (see leaflet in library).

Examples in the text:
Harvard system:

Smith and Bloggs (1971) have suggested that ……
It has been suggested (Smith and Bloggs 1971) that ……..

Superior number system:

Smith and Bloggs [23] have suggested that ……..
It has been suggested by Smith and Bloggs [23] that ……..

Examples in the References:
Harvard system:

Smith, G T and Blocks, M F (1971) 'The Economist and Valuation of Property Investment'. Macmillan, London

Superior number system:

23. Smith, G T and Bloggs, M G, 'The Economist and Valuation of Property Investment'. Macmillan, London

Where reference is made to journals, acknowledgements should be as follows:
Harvard system:

Jones, S. (1976) 'The Construction Technology of Pigeon Lofts'.
International Journal of Pigeon Fanciers, July.

Superior number system:

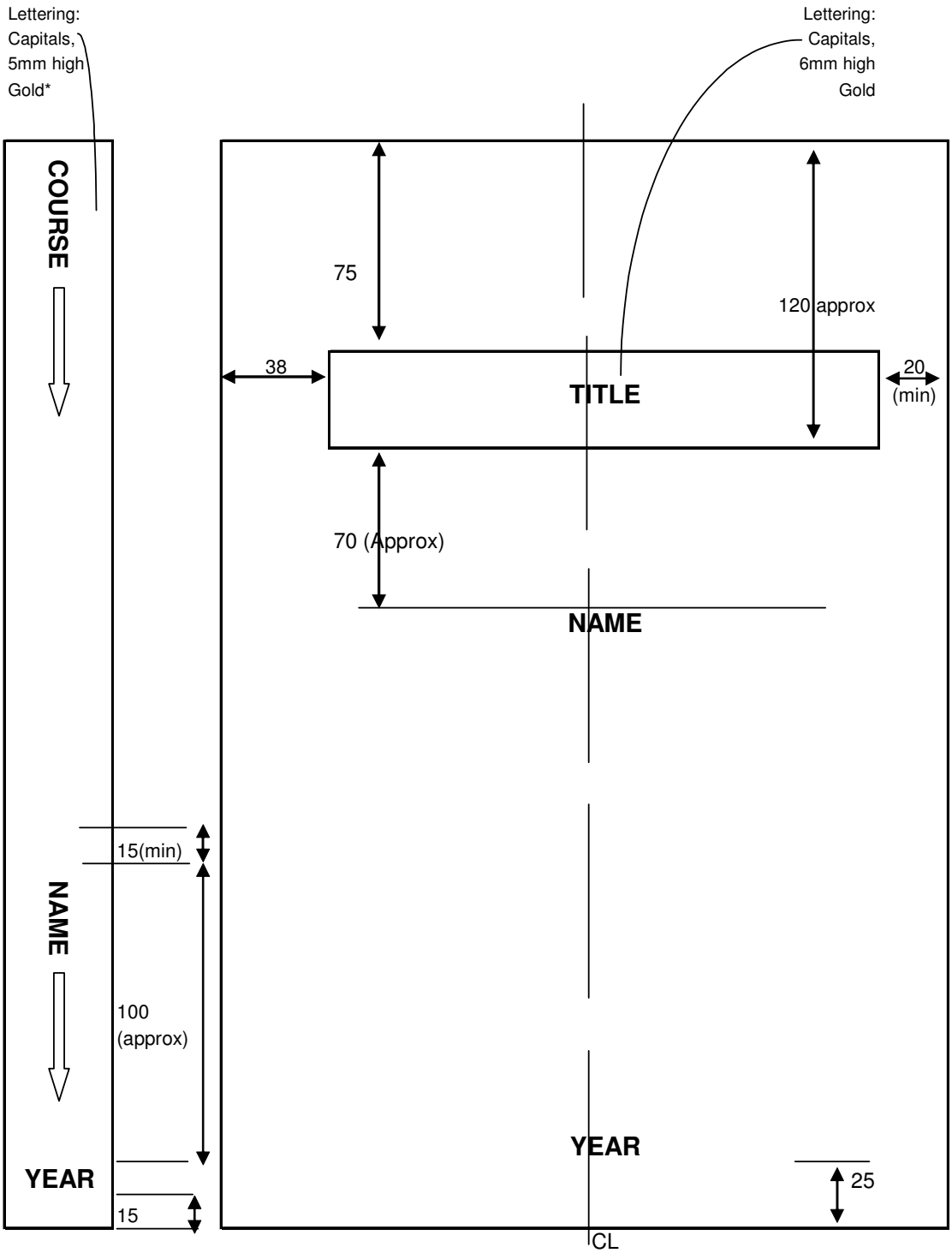
392. Jones, S. 'The Construction Technology of Pigeon Lofts'.
International Journal of Pigeon Fanciers, July 1976

Newspaper references should only be used very sparingly and preferably confined to the 'quality press'. Acknowledgements should be made as above.

YOU MAY FIND IT USEFUL TO USE A CARDEX SYSTEM TO FILE REFERENCES IN "ALPHA" ORDER.

DISSERTATION BINDING FORMAT

Dimensions in mm



*May need to be smaller for long names

Colour: Burgundy

SPINE ***FRONT COVER***

Appendix 1

EXAMPLES OF ABSTRACTS, AIMS & OBJECTIVES, AND METHODOLOGY

Example One

PROJECT PROCUREMENT – WHERE DO WE GO FROM HERE?

By Brian Poulson

INTRODUCTION

The concept of project procurement is an emotive one and one which generates a great deal of debate. It is a concept which relates to the procurement of any discrete event, operation, etc., but in the context of this Dissertation it is discussed in relation to the construction industry, i.e. the procurement of building or civil engineering works.

Project procurement can be effected in a multitude of different ways, each approach frequently being considered to be better than its rivals.

Over a period of several hundred years, one particular approach to procurement has evolved, which has become the "standard" or yardstick, and which approach is under constant pressure to be changed, as a result of its shortcomings, whether real or apparent. This is known as the "traditional" approach to procurement.

This Dissertation reviews the evolution of the traditional approach, describes its mechanisms and assesses the advantages and disadvantages to be gained from its use.

Aims & Objectives of Dissertation

The main aim of the Dissertation is to try to ascertain whether the criticisms leveled at the traditional approach are justified, and therefore whether the use of the approach remains valid or whether it should be replaced by an alternative approach to procurement.

In order to judge the validity of the traditional approach, the major alternative approaches are assessed in detail. The mechanism of each approach is examined and the advantages and disadvantages of each are assessed. The ability of each of the alternative approaches to overcome the major criticisms relating to the traditional system are discussed and proposals are made regarding future project procurement.

There have been very few attempts to assess the validity of the traditional approach to procurement against all of the major alternative approaches. The normal approach has been to suggest that there are problems to be experienced with the use of the traditional approach, and then to suggest that one particular alternative approach solves all of those problems and should be used to be exclusion of all others.

The aim of the Dissertation is therefore to take a totally objective view of the problem, and in the process endeavour to reach a useful and satisfactory answer. It is essential that the important of the matter, and its inherent problems, is recognized and the necessary action taken. Project procurement, in the construction industry, in UK in 1983 accounted for some £25billion of expenditure or some 8% of Gross Domestic Product. It is therefore essential that everybody concentrates their minds on ensuring that this money is effectively spent.

Example Two

THE PROBLEMS OF FORECASTING DEMAND FOR COMMERCIAL DEVELOPMENT OF INDOOR SPORTS FACILITIES – A CASE STUDY: SQUASH

By Paul Davis

INTRODUCTION

The commercial development of squash facilities grew significantly during the 1970's with a major input during this period from private and commercial organizations. The criteria used for design of facilities were documented by such organizations as the Squash Rackets Association and the sport increased in popularity both from participants wishing to achieve excellence in the sport and also from those wishing to gain benefit from intensive exercise gained over a short period. The sport was predominantly male orientated with participants often playing two or three times per week.

Against this background, the growth of squash in the 1970's was accompanied by an increase in the amount of national research into leisure claiming that increased participation in sport generally and in indoor sport in particular would give rise to a huge demand for increased facilities.

Public and voluntary organizations provided more "sports halls" and "leisure centres" incorporating squash facilities, and at the same time members clubs and commercial organizations and private individuals increased their share of the market in the popular belief that global forecasts correctly predicted a continuing increase in the general level of provision for squash facilities.

The Sports Council in particular in its most recent reviews still promotes the need for increased provision for facilities from both the public and private sectors directly resulting from their global forecasts of increasing participation.

There are now conflicting views on such predictions and on the present state of play as far as squash is concerned Socio-economic changes during the 1980's have seen a differing approach to leisure development by commercial organizations; scarcity of land and the priorities of majority of minority groups has resulted in situation where developers often use leisure provision for planning gain to enable them to embark upon more profitable development or alternatively sports facilities are invariably incorporated within more comprehensive public and private leisure schemes. It is therefore contended that whilst it is a popular belief that the level of provision for squash facilities is largely based upon global forecasting, the entire methodology for estimating demand in this particular sector should be reviewed and by necessity local forecasting and traditional development appraisal methodology should be examined in order to assess whether commercial development in this field is generally still viable in present conditions.

Aims & Objectives of Dissertation

The aims and objectives of this Dissertation are to review the development of squash and the present state of the art and to examine the conflicting opinions exploring the hypotheses that the level of provision for squash facilities is largely based upon global forecasting.

Chapter 1 traces the origins and growth of the game, examines the pattern of development and highlights those aspects of social significance. The physical characteristics of facilities are

reviewed and any changes that have arisen in technical design observing the relevance of these in relation to the recent innovations and changes in fashion.

Chapter 2 examines the State of the ART today reviewing the early aspirations of the squash industry and comparing current views assessing the impact and relevance of sponsorship and franchising and the significance of fashion.

Chapter 3 compares the methodology of global, regional and local demand forecasting and examining its relevance to commercial squash development.

Chapter 4 examines in more detail the leisure project decision flow and in particular compares the development and uses for any local project with a view to highlighting possible areas of shortcomings in the leisure decision processes.

Chapter 5 summarises these findings and reaches relevant conclusions where appropriate.

Methodology
The methodology used in this Dissertation has been literature search, interviews and observations. Indented paragraphs have been used for quotations.

A number of problems were highlighted in approaching the task of the study of commercial squash development and it is relevant to note that many of the same problems were identified by leading researchers in the topic over 10 years ago. Some of these problems should be pointed out at this stage.

1. The majority of the research material available on demand forecasting was written in the early 1970s and has not been updated.

2. Whilst the Squash Rackets Association has records of associate members of their organization, there is no reliable information existing at present recording the total number of commercial squash clubs.

It will be observed by reference to the list of members of the Squash Rackets Association in the County of Kent attached to the Appendix of this Dissertation that they are composed of the following types of organizations:

- Army/Navy/Air Force Clubs
- Sports clubs of industrial organizations
- Local Authority establishments
- Schools/Colleges/Universities clubs
- Members Clubs, e.g. attached to a business club
- Country Clubs
- Sole proprietary clubs
- Clubs owned by Private Limited Companies

In most cases, apart from some indication from the name of a club, it is almost impossible to discover the category into which the club fits and in addition not all the squash clubs in the country are affiliated to the Squash Rackets Association.

3. Club spokesmen were reluctant, even unwilling to discuss the financial structure of the club or the basis upon which they carried out their operations.

As a result a considerable amount of time was consumed in a flurry of irrelevant tangents and an accurate investigation of the macro-aspects of the industry was made virtually impossible without visiting every club in the country.

Appendix 2

MATHEMATICAL MODELS

Mathematical modeling of natural phenomena is a part of applied mathematics. Applied mathematics is concerned with giving us a better understanding of how systems behave by the use of mathematics. For the particular phenomenon being studied, we first start out with a fairly crude model using some basic parameters and variables. Mathematics is then used to examine the effect of the variables. It may be necessary to test the model by a laboratory experiment, questionnaire, opinion, database, computer, etc., depending upon the identity of the model chosen. Should it be found that the test and the model give different overall results, then we need to look at both the basis of the model for accurately describing the actual behaviour and/or the test.

As a rule, there are no neat rules for mathematical modeling as each problem is different and requires a slightly different approach. However, there are some ground rules that can be used:

1. Begin with the simplest model possible and then include more and more features as the phenomenon becomes better understood.

2. Look at a linearised version of a non linear problem to start with, but be aware that the non-linear problem may lead to quite different results.

3. Try different approaches to the same problem. If one fails the other may succeed.

4. Use your imagination.

5. Do not discard traditional mathematics, science or engineering just because they might appear to you to be out of date. Everything tends to work cyclically and old ideas resurface.

It is not essential, for the purposes of the dissertation, that the results of the test and the mathematical model should be identical. It is the approach that is important, but of course, it is always satisfying when there is a measure of agreement between the two approaches

Appendix 3

DISSERTATION TUTORIAL WORKSHOP – NOTES ON CONDUCTING RESEARCH

Construction, property and housing professionals engage with research in various ways. They may be consumers of research outputs when they read, interpret and act upon recent research findings by other organisations. They may commission research to find out what is going on in the market etc. Or they may undertake research for a client or funding body. Most of the larger firms of chartered surveyors have research departments, which provide information and advice for clients and internal departments. There are stand-alone property research companies who provide information for property investors and developers. The RICS has its own research department. At the very least, students on property related programmes will be expected to carry out some research for their final year dissertation and to justify the research methodology that they have adopted.

Research Methodology? There are different ways to carry out research. Each research method has its advantages and disadvantages. Below, four commonly used research methods are considered (it does not mean that there are only four methods).

1. Literature Review

This involves searching out and reading/interpreting material in books, journals, government reports, government policies, conference papers, reports from professional bodies, theses, Hansard, committee reports and minutes. Material may be published or unpublished.

Using Abstracts, Barbour Microfile, CD Roms, and the Internet assists the process of finding relevant material.

***Advantages*:** Where a topic has been investigated before, there is likely to be published material on it. The publications are likely to have been produced by experts in the particular field. Literature reviews are often the best way to establish the history of a subject and can be undertaken reasonably conveniently.

***Disadvantages*:** The material may be stale, due to long lead in times to publication. The material may contain the bias of the authors. There may only be limited coverage on very specialised topics. The authors of previously published material will have been writing from a particular perspective that was important to them at the time, so that the analysis and findings that they might have reached are unlikely to be an entirely satisfactory fit with the problem in hand. The quality of published material on any subject is likely to be variable. A so-called `desk study' is only likely to take the researcher so far and it is usual in most research projects that another research method will have to be used to add `currency' to the project.

2. Questionnaires and Surveys

Questionnaires can be a valid way of obtaining up to date information from the particular `population' being surveyed. Questionnaires would usually be worked up in draft form and piloted before they were released. Questionnaires can yield quantitative and qualitative data. However researchers often make the mistake of making questionnaires far too long and complicated, building in a disincentive for recipients to respond. To be scientific, the sample surveyed must be representative of the overall population (however defined). If the criteria are met and the response rate is satisfactory, then there may be the opportunity to conduct statistical analysis of the returns. This may be problematic where the population is large.

Advantages: Responses can reflect current opinion. They can yield meaningful data where the questionnaire is well designed. The questionnaire can be tailored specifically to the research task in hand.

Disadvantages: Questionnaire response rates are often low; the status of the organisation undertaking the survey will influence response rates. The design, delivery and subsequent analysis of questionnaires takes time and money. There is usually only a `one-hit' opportunity to capture data. The populations being surveyed are often jaundiced from receiving similar requests for information and will tend to bin speculative questionnaires. Questionnaires no longer have novelty value for the recipient.

3. Interviews and Expert Opinion

Interviewing somebody (usually a practitioner or expert) at the `coal-face' is a valuable way of gathering up to date information on an issue. For example, experts can give valid insights into the working relationships between organisations, or how a particular piece of legislation is being interpreted in practice. Government still invites expert opinion when considering change to legislation or policy, by interviewing experts in the select committee stage of a bill. However the quality of information obtained will rely on the skill of the interviewer and the degree to which the interviewee is briefed in advance on the agenda for discussion. Not all interviewees will be willing to respond fully on all issues.

Advantages: Interviews can yield valuable insights and up to date information on an issue, they can lead to further research connections being made.

Disadvantages: The population interviewed is unlikely to be extensive and thus the results are unlikely to support quantitative analysis. Responses may be biased towards the objectives of the individual being interviewed. Experts may be hard to track down and may be difficult to interview.

4. Case Study Analysis

An excellent way of analysing how an issue is being dealt with in practice. Case studies can be described and interpreted relatively easily, although identifying a valid and accessible case study at the outset of a project may not be easy. Case studies often `concretise' a research project, and are usually interesting and easy to interpret from the point of view of the target audience. They are a good way of providing qualitative data. Sometimes the researcher is faced with the dilemma of whether to analyse a case study in-depth, or to tackle several case studies in less depth in order to provide breadth. Discussion with a supervisor or steering group often helps when the researcher faces this sort of dilemma.

Advantages: The selection of a few case studies focuses resources and may allow a more in-depth analysis. Case study analysis forces the researcher to consider all the connecting issues which have been brought to light while researching the case study.

Disadvantages: Care has to be used when interpreting the results from a small sample of case studies, because the case studies assessed in depth may not necessarily represent wider practice. Sometimes the sequence of events related to the case(s) under examination has not been completed and may require `longitudinal study'. For example, in the 1980s the government wanted to know if Enterprise Zones were achieving their objectives. The research study had to take place over 10 years (the lifetime of the EZ experiment). Where several case studies are being used, discipline is required to compare findings on a comparable basis.

Other Issues Related to Conducting Research

Time and sequence. Most researchers do not work methodically and seldom think about a logical sequence in which to undertake the research project. Researchers are notorious for over-running, having underestimated the time needed to complete a project. Slippage has to be allowed for, working back from a completion date. Most research projects are characterised by fits and starts of creativity, activity and production.

What's a hypothesis? A hypothesis is often used by researchers in the physical sciences, but not always in the social sciences, where *aims and objectives* may substitute. The Oxford Dictionary defines a hypothesis as:

> "A supposition made as a basis for reasoning, without reference to its truth, or as a starting point for investigation; a groundless assumption."

A hypothesis should be clearly defined and should be used for `testing' not for blindly supporting. A hypothesis is a means to an end (a research tool) which may be proved or disproved following objective research.

A tightly defined hypothesis will make the researchers job easier. For example consider the stages in formulating the following property related hypothesis:

"Offices are a good investment"

"Prime offices are a good investment"

"Prime offices in the West End are a good investment"

"Prime offices in the West End offer strong growth potential relative to other forms of investment"

"Financial institutions are currently adding prime offices in the West End of London to their portfolios, because of the growth potential in the medium term relative to other forms of property investment"

The researcher could carry out research to prove or disprove the last version of the hypothesis above. This would normally be done by analysing `empirical evidence' gathered by one or a combination of the research methods mentioned above. However it would have been a monumental task to prove or disprove the first draft of the hypothesis, which was far too wide and vague.

Reading

Bell, J. (2004) *`Doing your research project'* Open University Press.

Berry, R. (2000) *`The research project and how to write it'* Routledge.

Naoum S, (2005) *"Dissertation Research and Writing"* B-H

Appendix 4

WEEK BY WEEK TUTORAL PROGRAMME

Week 2 Discuss dissertation handbook, Process and Preparation, overall structure of dissertation and timetable. Introduction to choosing a topic.

Week 3 Choosing a topic:

- Using the library, literature search*
- Developing your ideas/proposals. "Working" titles.
- Developing aims and objectives

Weeks 4/5 Research methods:

- Role of the literature review. Background and theoretical framework, identifying issues etc.
- Data collection, case studies, questionnaires and interviews
- Framing your aims and objectives and planning your study: rationale, key questions, research statements.

Weeks 6 – 10 Students develop proposals, identify and assess sources of information, issues and controversies, discuss their research proposals and methods, aims and objectives and plan dissertation structure.

Weeks 11 – 12 Group presentations. Each student to make a presentation of 5 minutes with overheads and bullet points, covering the main objectives 1 – 4 as defined in the dissertation supervision record (Page 10). Is work programme realistic? The research and draft version should be complete by the end of term 2.

Student output:

Weeks 2 – 5:

- Literature search.
- Submission of working title for dissertation
- Identification of research methods required

Weeks 6 – 10:

- As above

Weeks 11 – 12:

- Workshop presentation, including proposed work programme with dates/weeks.

TERM 2. Submit work as you go to obtain feedback.Week 10 term 2 is realistically the last date for feedback. Tutors may insist on arranging meetings on agreed weeks.

* Note Library sessions on e-journals and searches may take place during or outside dissertation sessions and you are strongly advised to attend.