**A SHORT GUIDE TO SELECTING A PROJECT AND WRITING YOUR MASTERS DISSERTATION**

Modules (Units):

MSc UFMED4-60-M (EMATM0015)

CDT UFMFRG-80-M (EMATM0020)

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**1. Research Project Selection**

**1.1 Project Selection and Finding a Supervisor**

There are two main ways in which a research project (and supervisor) can be selected:

**A. Co-created Proposals**

Students begin discussions with potential supervisors at a relatively early stage in the year to discuss a research idea and formulate a suitable research project. If you wish to base your dissertation on a co-created proposal, you should email the dissertation module leader ([Tony.Pipe@brl.ac.uk](mailto:Tony.Pipe@brl.ac.uk) or [Brian.Carse@uwe.ac.uk](mailto:Brian.Carse@uwe.ac.uk) for CDT and MSc dissertations respectively before the end of the first term (i.e. before Christmas).

**B. Advertised Projects**

Supervisors advertise research projects and students submit first, second, third etc. choice of projects. Projects are then allocated using a numerical optimization algorithm to fairly match students to projects taking into account your preferences. Projects are normally advertised in November and allocated before the end of the first term (i.e. before Christmas).

By the start of the new calendar year you should start to be in regular contact with your supervisor(s).

**1.2 The Role of Supervisor and Responsibilities of the Student**

**Role of Supervisor**

Your supervisor will be your primary point of contact to provide advice and support over the project and to whom you should present your plans and discuss progress.

The academic supervisor performs many functions and is there to facilitate and not to lead; hence the responsibility for the quality and content of a dissertation is entirely that of yourself, the student. The supervisor role includes the following:

1. To advise the student whether or not the project appears to be feasible and the possible risks that may be involved, for example problems in trying to access information, potential poor response rates to surveys concerning commercially sensitive issues.
2. To assist the student in tailoring the proposal to the time and other resource constraints.
3. To assist the student at the outset in finding useful and relevant reading material and appropriate academic framework within which to place the topic.
4. To advise on the choice of suitable methodological approach (es).
5. To monitor progress and to advise on what is required to achieve a satisfactory dissertation.
6. Where relevant, to liaise periodically with the company supervisor and resolve any problems the student may have in obtaining access to company information or personnel.
7. To first-mark the dissertation, and to submit a marker’s report;

You cannot expect supervisors to manage you as well as all the other demands they have on their time; indeed you should “manage” your supervisor when it comes to your dissertation! Listen to advice given carefully. It is based on many years of experience. However the directional decisions are your responsibility to make – it is your project and your dissertation.

**Responsibilities of the Student**

1. To maintain regular contact with the academic supervisor. It is the student's responsibility to inform their supervisor of progress and to lead the development of the dissertation. Difficulties must be communicated at the time they are encountered. Retrospective information is not acceptable.
2. To write the dissertation in a good standard of clear English using appropriate academic terms and citation and referencing conventions. It is not the responsibility of the supervisor to ensure that this condition is met.
3. To write the dissertation with guidance from the supervisor. The dissertation and research work must be your own. The dissertation is to reflect your subject understanding and research abilities, not that of your supervisor.
4. Where a company project is undertaken, to attend on a regular basis as required, and to maintain regular contact with the company sponsor and to undertake a final presentation to the company management team (not relevant to LINCS students).
5. To inform the Programme Director, Dissertation Module Leader and academic supervisor of any substantive impediment to working on the project (which may require application for special circumstances appeal) during the time nominated for working on the dissertation.

If during the preparation of the dissertation, the focus and direction of the dissertation changes substantially from that outlined in your Dissertation Proposal then you should immediately discuss this with your academic supervisor.

It should be emphasised that the dissertation is entirely your own work. However, you may ask your supervisor to read in detail a draft of a portion of your dissertation normally up to a maximum of two chapters, in order to give feedback on presentation, content and style. Academic supervisors may of course pass comment on overall content and structure of the thesis including chapter outlines and may scan quickly through other chapters at their discretion. The academic supervisor is not expected to check or correct grammar.

**Dissertation Supervisor Meeting Schedule**

Workload allocated to supervisors for project supervision is limited. Students should plan and arrange meetings with their academic supervisor across the duration of the dissertation as required. Students need to give sufficient notice when arranging meetings and be aware that their supervisor’s time is limited. The purpose of these meetings is to discuss progress and resolve any difficulties. You will be expected to take a proactive approach to these meetings and bring material or options to be discussed rather than expect your supervisor to say what should be done next.

Decide what you would like to achieve from each meeting **before** making an appointment and, if possible, communicate your needs to the supervisor in advance. This will help to keep each meeting focused.

Initial meetings to discuss topics and planning are key to ensuring the student is heading in the right direction. Responsibility for scheduling the meetings will be with you. Your academic supervisor will endeavour to meet you as soon as possible, but you must remember your academic supervisor has other work commitments, conferences to attend, research to undertake and will also take a vacation some time through the summer period. If you are based abroad then progress meetings can take place using e-mail.

You will be required to keep a record of each of these meetings outlining the topics discussed, your understanding of key comments and advice made by your supervisor, the dates of meetings, and any action points. An email record of each meeting should be sent to your supervisor after each meeting.

**1.3 Definition of a Research Problem**

Many students drift into doing a project without clearly defined objectives. Defining an area of work is only the first step. You need to review the scientific literature in your chosen area and then define a research problem that you propose to investigate. The problem must be feasibly resolvable with available resources.

If you have defined your research problem clearly, then the ways in which you propose to study that problem should also be clear. However, guard against rushing into the investigation. Consider alternative approaches. Review the scientific literature again. What are the limitations of the work done by others? Can you devise a novel or improved approach? Have you considered how you will analyse your results?

The following checklist can be used as a final check to ensure that you have avoided the most common pitfalls in project selection. It is neither exhaustive nor exclusive but should help to guide discussion with your supervisor:

1. I have reviewed the current literature on my chosen topic.
2. I have a clearly defined research problem/question.
3. I have considered carefully how best to investigate my research problem.
4. I can state clearly why my approach is different or better than that of other workers.
5. I can state clearly why my project is worth doing.
6. I have considered carefully how I will analyse the results that I obtain.
7. I have a clear, flexible plan of work.
8. I can complete the project in the time available.
9. I am not wholly dependent on the work of others to complete this project.
10. I have read the UWE regulations carefully and understand them fully.
11. I am clear about what I should do if I run into difficulties.

**2. Writing the Dissertation**

**2.1 Introduction**

The first issue is to plan what you want to present and how you are going to develop your points. For the dissertation you will be expected to investigate a topic, presenting your findings and evaluating them. Therefore you will usually need to explain the following:

* The key issue (with clearly defined boundaries) you are addressing.
* The methods of approach you have used.
* The scope and nature of the documentation that you have used in your research.
* What you have discovered, what recommendations you are making.
* Your conclusions.

Before you start there is one very important issue to define clearly. What is the dissertation about? Often setting the title is useful as this serves as a succinct one line statement of the whole dissertation. This is the key to success. Check that you really understand what you are planning to do. If in doubt, ask your academic supervisor. Once you are clear about what you have to do, it is time to start working out the structure you will use and planning your work. Whilst the exact nature of the topic you are covering will define the exact detail of any dissertation there are some generic requirements for any piece of work.

The dissertation should be divided into chapters and sections appropriate to the topic and type of dissertation chosen. The following elements are *typical* of the traditional dissertation. You should discuss the overall structure of your dissertation with your academic supervisor.

**2.2 A Guide to the Chapters of the Dissertation**

***1. Title Page***

The title page should include the title, the degree for which the dissertation is submitted, the authors name and the date of submission (see Appendix 1 for example title page).

***2. Abstract***

The dissertation should contain an abstract. A good abstract is difficult to write and can only be completed after the full dissertation has been written. It represents a brief summary of the results of the dissertation research. By summarising the results of the research, it allows other people to get an idea of what was accomplished without having to read through the whole dissertation. Other scholars can read an abstract to decide if looking at the full work will be worthwhile.

Hints as to what to include in your abstract:

* **Aim and objectives:** What are the main themes, ideas or areas of theory being investigated?
* **Boundaries:** What is the context and background to this dissertation?
* **Methodology:** What was/were the main method(s) employed to generate the results?
* **Results:** What were your main findings?
* **Conclusions:** What are the main conclusions that you arrive at when viewing the entire dissertation?
* **Recommendations:** (if appropriate) What solutions do you offer in answer to the problems posed in the research objectives?

***3. Acknowledgements***

***4. Contents Page***

The contents page should list the chapter headings, appendices, references and the pages on which they can be found. Separate listing should be given for lists of figures, tables and abbreviations. You will find this easier to create these if you know how to generate these lists using the indexing and style functions within Microsoft Word or Latex.

***5. Introduction***

The introduction chapter can be viewed as the chapter that “drives” the rest of the dissertation document. It should typically contain:

* an introductory paragraph or two stating the general field of interest;
* a background to the problem, the context in which the research took place, **reasons why the study was carried out** and the **significance of the study**;
* a statement of the problem to be addressed, possibly arising from an identification of a “gap” in extent knowledge;
* a clear and succinct statement of the primary research question(s), aims and objectives of the study documented in the dissertation;
* a summary (“road map”) telling the reader what topics are going to be discussed in each of the dissertation chapters and how the chapters are related to each other.

***6. Literature Review***

The main reasons for the inclusion, in a Masters dissertation, of a literature review section are:

* To present and to analyse, in a critical manner, that part of the published literature which is relevant to your research topic and which acts as the basis for a fuller understanding of the context in which you are conducting your research; thus helping the reader to a more rounded appreciation of what you have completed. Remember, critical does not mean looking at the negatives but forming an evaluation.
* To act as a backdrop against which what you have done in the remainder of the dissertation may be analysed and critically evaluated so as to give the reader the opportunity to assess the worth of your writing, analytical and research skills.
* To show that not only have you discovered and reported what you have found to be relevant in the literature search, but that you have understood it and that you are able to analyse it in a critical manner.
* To show that your knowledge of the area of interest is detailed enough that you are able to identify gaps in the coverage of the topic; thus justifying the reason(s) for your research.
* To show that you know what the key variables, trends and ‘actors’ are in the environment of your study, i.e. you show that you know what the important issues are that need to be investigated.
* To enable readers to be able to measure the validity of your choice(s) of research methodology, the appropriateness of the process by which you analyse your results, and whether or not your findings are congruent with the accepted research which has gone before.

The literature review is presented in the form of a précis, a classification, a comparison and a critical analysis of that material which is germane to a full understanding of your research study. Such published material may be drawn from all, or a combination of, textbooks, journal articles, conference papers, reports, case studies, the Internet, magazine features or newspaper articles. It should be remembered, however, that the most important source of academic literature are journal articles and you should ensure that you are familiar with the most recent publications in journals relevant to your subject area.

Remember that your literature review should lead and justify the research objectives and questions of your dissertation. Your literature review should not just be a catalogue of authors, frameworks and ideas but should attempt to introduce a critical evaluation of those authors’ work.

***7. Research Methodology***

You should begin the Research Methodology chapter by stating, again, the research objectives of the project. This will enable the reader to make an assessment as to the validity of your chosen research methodology.

This chapter is that part of the dissertation where you have the opportunity to justify to the reader the process by which the research questions, which were derived by an analysis of the relevant literature, were answered. It is not sufficient to say, for example, “suitable respondents were sampled using a quota sampling technique and then surveyed using a postal questionnaire” and then leave it at that. It might well be the case that, given the problem(s) to be investigated, such a choice of research methods is entirely appropriate. However, if you have not taken the opportunity to justify your research choices to a reader they could be correct in assuming that you have, by chance, merely guessed at what would work and, more by luck than judgement, arrived at the ‘correct’ solution to the problem.

The term ‘methodology’, particularly when employed in industrial research, does not just mean method, but also the governing philosophy behind the methods employed.

The chapter on research methodology must, painstakingly argue for, and justify each, decision that is taken when arriving at the way in which the research is to be organised. Every time that you, the researcher, have to make a choice from a number of options, you must state what each of these are, why you made the choice you did, and why you rejected those not used.

The conclusion of this chapter should provide a summary of the main points that have been covered. The conclusion should also direct the reader as to how the contents of this chapter link in with the contents of the next chapter, your findings.

***8. Findings / Results / Data Analysis***

This chapter presents the evidence and/or results of primary research which you have undertaken. Depending upon your subject area this can be in the form of detailed quantitative models, hypothesis testing to some basic analysis using basic descriptive statistics or qualitative techniques dealing with structured content analysis, textual analysis, to case study descriptions.

The main part of the chapter is the presentation of the data that you obtained. Even projects of relatively moderate dimensions will generate a large amount of data which has to be considered. This data must be organised in a logical and coherently ordered whole so that your thought processes and interpretation are clear to the reader.

Whatever form of data analysis has been undertaken, it must be accomplished with care and attention to detail, as should the way in which the results are presented. Nothing is guaranteed to frustrate a reader more than to have to plough their way through an arid mass of tables, figures and statistics. Better by far to describe in an accessible manner (which does not mean that you should talk down to the reader) what the research has uncovered and to include only the most pertinent figures as evidence of your findings. Dissertations which included detailed modelling or quantitative analysis will clearly need to show all relevant assumptions, relationships and methods. Your academic supervisor will be able to advise on the level of detail required in the main body as opposed to that included in the Appendix.

Graphs, diagrams, pie-charts etc. are all useful ways of presenting research results; they are an imaginative way of ‘breaking up’ solid blocks of text – they let a little ‘light’ into the body of the text as long as they are relevant and illustrate your points. Keep your review to those items which are relevant to your research question and not just “everything I found out”.

There will be problems in the execution of any research project and their occurrence should be brought to the attention of the reader. Without stating them, one of the essential elements of the context in which the research took place will be missing.

Not all dissertations contain quantitative data. In many situations, students will have made extensive use of qualitative research techniques such as focus groups and/or in-depth unstructured interviews. While quantitative data lends itself to graphs, tables and so on, qualitative data, and the way it is presented, pose particular challenges for students. As ever, your objective should be based on the belief that the data must be presented in such a manner as to make it easy for the reader to follow the logic of the analysis.

The analysis of qualitative data should be based on the research questions and issues that you explored during your fieldwork. For instance, you may have addressed six or seven critical questions in a series of interviews. Each of these questions should be examined separately, rather than describing each focus group in turn. This provides a degree of logical flow and development to the analysis. In addition, it is advisable to focus on the points of agreement and disagreement that emerged during the interviews. This should be supported with relevant quotations from the transcripts of the interviews. You should avoid lengthy quotations, unless they are of critical importance. However, short excerpts enrich the reader’s understanding of the issues and provide you with the opportunity to shed a clearer insight on the topic.

Many students make the mistake of providing a very superficial, descriptive analysis of qualitative data. This does not allow you to demonstrate that the research you undertook was of a substantive nature. Tables can also be included that reflect the respondent’s overall attitudes, perceptions and views about the themes.

You are not required to include all the transcripts of interviews, surveys or data sheets. Only include the summarised data in the main body of the dissertation. Appendixes should be restricted to no more than 25 pages. You can keep additional information in a folder for use by the markers if requested.

***9. Discussion***

In the introduction to the dissertation you described the context of the research. In the literature survey you analysed the work of previously published authors and derived a set of questions that needed to be answered to fulfil the objectives of this study. In the research methodology section you showed the reader what techniques were available, what their advantages and disadvantages were, and what guided you to make the choice you did. In the results section, you present to the reader the outcome of the research exercise.

The introduction of this chapter reminds the reader what, exactly, were the research objectives. Your review of the literature and your evaluation of the various themes, issues and frameworks helped you to develop a more specific set of research questions. In essence, your analysis of the data that you have collected from your fieldwork should provide answers to these questions. You should, as a matter of priority, focus attention on data that is directly relevant to the research questions. You should avoid the mistake of including analysis that might be interesting in a general way, but is not linked to the original direction of the dissertation. Peripheral data can be included as an appendix. The introduction should also explain how the results are to be presented.

**This chapter is at the heart of the dissertation and must be more than descriptive**. This chapter develops analytic and critical thinking on primary results and analysis with reference to theoretical arguments grounded in the literature review. You should try to highlight where there are major differences and similarities from the literature or between different groups. Where a model or framework of analysis has been used or is being developed you should highlight the main relationships as well as explaining the reason and significance behind features or decisions being discussed.

***10. Conclusions***

Here you will bring together the work of the dissertation by showing how the initial research plan has been addressed in such a way that conclusions may be formed from the evidence of the dissertation. No new material or references should be placed here. The conclusions should make a statement on the extent to which each of the aims and objectives has been met. You should bring back your research questions and state clearly your understanding of those questions. Be careful not to make claims that are not substantiated from the evidence you have presented in earlier chapters.

If you are undertaking a company project based around a business issue do not confuse recommendations for the company with conclusions. If you want to include a list of recommendations then do so in a separate short chapter. **The conclusions address the wider understanding of the issue you have been studying.**

You should include a short sub section on any suggestions for further research for colleagues who might wish to undertake research in this area in the future. There should also be a short statement of the limitations of the research. Often as a single case study or limited range of companies you cannot really claim that your research holds for all companies. However, by adopting a rigorous approach to your literature review and methods which have validity and can be repeated you can make a reasonable but limited claim that your conclusions should be taken seriously.

**11. References**

All references used in writing the dissertation (whether direct quotations or paraphrasing) should be included in a reference list/bibliography, compiled in alphabetical order by author. The Harvard system for listing references should be used.

The University has a policy which covers all Honours students and all Masters students in relation to a reference system. **It is important that you get your citations and references correct**. You must always cite the source of your material; **inadequate citation could leave you open to the suspicion of plagiarism.**

***11.1. Within text citation***

This is where any formal mention that you make in your dissertation to something written by someone else. Every citation must be supported by a **reference** which supplies the details which will enable the reader to follow up that citation. The University employs the Harvard System of referencing. If you refer to the work of an author in your text then it should be cited as, for example,

Smith (1997) states that the shoe size of an individual is a function of three criteria.

or

Shoe size has been demonstrated to be a function of three criteria (Smith

1997).

Perhaps more than one author has made a broadly similar point and you want to include them all. In such a case the citation should appear as follows:

Logistics research is always important in new product development (Freeman

1997; Hardy 1989; Willis 1999).

If you quote directly from an author's work you should include the page number from which the quotation is taken, e.g. (Smith 1997, pp 4.)

***11.2. End of text referencing***

The list of references is placed at the end of the dissertation (in alphabetical order of first author’s surname), as follows:

*For a journal:* Smith, S. (1997), The Effects of Shoe Size on Consumer

Behaviour, *Journal of International Shoe Manufacturers*, Vol. 34, No. 45, pp

23-45.

*For a textbook:* Smith, S. (1997) *Strategy, Marketing and Consumers*, Paisley, Academic Free Press, 7th edition.

If you are only referring to a small portion of a large text, then you must specify which parts are relevant by adding either the chapters, “chapters 4 and 6”, to which you are referring, or the appropriate pages (Smith 1997 pp 126-341).

***11.3. Text notes***

Text notes can provide additional information on points made in the text of the dissertation. They may be presented as footnotes or as endnotes, either of which should be **kept to a minimum**. Neither footnotes nor endnotes should be used, however, if the sole purpose is to give a page or reference, these should be presented as parenthetical insertions into the main text of the dissertation. Articles and books mentioned in the text, including text notes, should be identified by the author’s name and the year of publication. The title of the article or book should then be listed in the dissertation’s list of references.

**12. Appendices**

Appendices may be used to provide relevant supporting evidence for reference but should only be used if necessary. Students may wish to include in appendices, evidence which confirms the originality of their work or illustrates points of principle set out in the main text, questionnaires, and interview guidelines. Only subsidiary material should be included in appendices. Students should not assume that Appendices will be read by Examiners in detail.

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**A Couple of Hints on Good Writing Style**

**Using Introductions and Conclusions to chapters**

It is often considered good practice that each of your chapters include short introduction and conclusion paragraphs. The former provides the reader with a contents ‘map’ of what is to come, and the latter provides a concise summary of what they have just read. Each introduction should look back to the conclusion of the previous chapter, and forwards to the contents of the chapter which you are introducing. The conclusion should look back into the chapter just completed, and forward to the introduction of the following chapter. These conclusions and introductions act like small links which bind the ‘chain’ of the chapters together in a more seamless whole than would have occurred if the chapters had not been introduced or concluded; they ‘smooth out’ the transition from chapter to chapter and from topic to topic.

**A Post-Script on Good English**

Students are often so worried about getting their work finished that they do not think of themselves as writers, but what you say is inseparable from the way that you say it. Being able to express yourself well on paper is essential. If you have doubts about your abilities in this area, many of the study guides available in the Library or in good bookshops give excellent guidelines, but here are a few Do’s and Don’ts to help start you off.

**DO**

* Buy a good dictionary and use it. There is no shame in looking things up, but spelling mistakes can spoil your presentation and distract the reader. Word-processors have spellcheckers but there is no substitute for being able to spell correctly yourself!
* Read your work over carefully.
* Check that your writing is clear - you want to be sure your reader understands what you say.
* Keep it simple - never make the mistake of thinking that a long word is more impressive than a short one. It is not. It is the mark of an inexperienced writer.
* Be precise - have you said exactly what you want to say? Never use words unless you are sure you know their meaning.
* Learn to punctuate. Some good dictionaries give you basic rules, but if yours does not, then it is worth finding out about punctuation by using one of the study guides in the Library.
* Use past tense and third person.

**DON'T**

* Use jargon. If you need to use specialist vocabulary that's fine, but always choose simple, clear language when you can. If you do need to use specialist terms then it is a good idea to include a glossary.
* Use over-long sentences. A great many inexperienced writers use very long sentences and tack half a dozen clauses together with "and", "but" or "which". Short sentences are much less clumsy and a good deal easier to follow.
* Use slang or colloquial language in your writing. There is nothing wrong with slang or colloquial language in the right place. Everyone uses both in conversation all the time. But language has to be appropriate to the context in which it is used. In analytical writing, however such as you need for essays or reports, a neutral, formal style is better suited to the material and this is what you should try to adopt. Look critically at the style of the books and reports you read for your assignments and try to follow the example of the clearest and best written of these.

**2.3 Useful study guides**

Biggam, J. (2015) *Succeeding with your Master’s Dissertation*, Open University Press, eISBN-13: 9780335242269

Allison, B. (2004) The Student’s Guide to Preparing Dissertations and Theses, London, Kogan Page, ISBN 9780415334860

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**2.4 Presentation and Format of the Final Dissertation**

**Length**

The dissertation should be between 12,000 and 20,000 words in length. There is no 10% margin on top of this. Please indicate the approximate length of your dissertation at the beginning.

The word count relates just to the main text. The abstract, the reference list and any appendices should not be included. However, appendices should be used sparingly. For example, interview schedules might be included but not complete transcripts of all interviews undertaken; extensive photocopied extracts from other publications should be avoided. In general, anything that is important should be included in the main text.

**Overall presentation and format**

Your dissertation should be on A4 paper, using 1.5 spacing and 11 point Arial font. There should be a margin of at least 3 cm down the left hand side of each page to allow for binding. Pages should benumbered, preferably at the bottom-centre of each page. Double-sided printing is recommended but not required. The dissertation should include a contents page, and any illustrations, figures and/or maps should be placed within the text at appropriate places on numbered pages, and themselves be numbered and titled.

The following sets out things you must include in your dissertation, and in the order specified here:-

1. A month before the submission date, you will be able to access a cover sheet from your MyUWE. If, for some reason you are submitting before this, you can create use a general coversheet, but please contact the module leader for advice. This cover sheet should go on the front of the work.

1. A title page should appear at the beginning which, as well as stating the title of your dissertation, should also include your name, the programme for which the dissertation is being submitted, and the month and year of submission. (in case of detachment of cover sheet)
2. Following the title page, there must be a page on which you make the following declaration:

"This study was completed for the MSc in (name of award) at the University of Bristol and the University of the West of England, Bristol. The work is my own. Where the work of others is used or drawn on it is attributed".

You should then sign your name beneath this declaration. This page should also state the number of words in the dissertation (excluding the bibliography and appendices).

1. You may include a confidentiality statement. Three levels apply and we ask that you include the appropriate statement on the page beneath the declaration:

1. The  dissertation  may  be  made  freely  available  immediately  for  academic

purposes  (this includes display in the Library for consultation purposes)

1. Limited confidentiality- the  dissertation  may  be  made  freely  available  after  two  years  for academic purposes (including display in the Library for open consultation)
2. Strictly  confidential- the  dissertation  is  confidential  and  may  be  made  available  only  for assessment purposes.

It is your responsibility to ensure that the correct confidentiality statement is included within your dissertation.  Where there is no statement requesting full or partial confidentiality it will be assumed that the dissertation can be made freely available, including display for open consultation in the library.

1. Following the declaration page, there should be a page containing the abstract - that is, a summary, in no more than 300 words, of what your dissertation is about and what its main conclusions are.
2. Following the Abstract page, there should appear a page with a table of contents, and then the dissertation itself.
3. The paper copies of your dissertation must be presented, softly bound; spiral binding is probably the easiest and cheapest option.
4. Submission details will be made available at least one month before the submission date.

**Appendix 1.** Example Title Page Layout

**Approaches to Project Management in the Underwater Basket Weaving Industry**

**A. Student**

A dissertation submitted in partial fulfilment of the requirements of the University of the West of England, Bristol for the Degree of Master of Science

Faculty of Irrelevant Analysis, University of the West of England, Bristol

September 2016

**Appendix 2. Example of (part of) a literature review, including critical discussion of published work with references**

1. **Introduction**

The application of image analysis techniques to the study of aggregate shape properties has become increasingly prevalent in recent years. It has long been acknowledged that the size distributions, form, angularity and surface texture of aggregates significantly impacts on the performance of concrete and asphalt mixtures. It is also generally accepted that the techniques currently used in industry to determine these properties are at best somewhat laborious. Furthermore, they are often subjective and provide only indirect measures of the properties of interest. Several authors have identified the ambiguities associated with particle sieve sizes and the corresponding dependent measures of elongation and flakiness (Kwan et al., 1999; Mora and Kwan, 2000; Persson, 1998; Lanaro and Tolppanen, 2002). The methods used to determine angularity are similarly limited (Wilson et al., 1997; Masad and Button, 2000). For example, the traditional measure described in BS812 assumes a causal relationship with packing density, defining an angularity number as the amount by which the proportion of solid volume in a packing density test falls below 67%. This somewhat arbitrary figure is thought to represent an optimal packing density given a sample of equally sized, perfectly spherical particles. However, it is hard to see how variations in size distribution, elongation and flakiness would not have equally marked effects on packing density as variations in angularity.

It is not then surprising that researchers and industry continue to look to image processing technologies for alternatives. One of the major difficulties encountered here is that of reconciling the results of an image-based analysis with those of the traditional industry techniques. For example, having developed a direct measure of angularity or surface texture using image analysis, one can only validate it using the indirect measures that one believed to be flawed or subjective in the first place! The problem is compounded when the properties of interest are arbitrarily defined. This applies particularly to the measurement of particle angularity, or conversely roundness. The European standard EN 933-5 describes how angularity should be determined by visually assessing what percentage of the particle surface is considered to be crushed or broken. This will yield different results from the Wadell approach of examining the relative radii of corners (Wadell, 1935) or from comparison with the similarly derived Powers scale (Powers, 1953), and different again from the results of a packing density test as described in the previous paragraph. Similarly, research into image-based analysis of aggregate properties has generally attempted to approximate angularity with the measurement of other morphological properties. Several researchers have attempted to assess angularity using measures of compactness, by calculating the perimeter-to-area ratio (in two dimensions) or the surface area-to-volume ratio (in three dimensions) of the particle (Mora and Kwan, 2000; Wilson et al., 1997; Masad and Button, 2000; Masad et al., 2001; Pons et al., 2002; Manohar and Sridhar, 2001). The rationale here is that the circle (or in three dimensions, the sphere) is the most compact shape, in that it has the shortest perimeter for a given area. As the shape becomes more angular the perimeter-to-area ratio increases. Masad et al (2000) use this method at low and high resolutions to gain a measure of both angularity and surface texture, on the premise that the perimeter is more sensitive to variations in angularity at low resolution and to variations in texture at high resolution. Wilson et al (1997) attempt to compensate for the effects of aspect ratio on compactness by comparing perimeter-to-area ratios with an equivalent ellipse rather than a circle. Masad et al (2001) also use the equivalent ellipse to provide a normalised measure of angularity. They propose an angularity index that compares the radii of the particle to those of an equivalent ellipse at a fixed number of angular increments, a technique that proved useful in predicting the rutting resistance performance of a hot-mix asphalt. The fundamental limitation of these approaches is that compactness and angularity are two different properties. Whilst there is undoubtedly some correlation, a shape does not necessarily become more angular as it becomes less compact. The validity of the measure further degrades when one considers that the particle boundary is generally represented using square pixels – a common problem with image-based measures of compactness is that in many cases they will actually return a square, or in three dimensions a cube, as the most compact shape (Bribiesca, 1997; Bribiesca, 2000).

Another approach is to compare the overall shape of the particle to that of a reference shape. Lanaro et al (2002) compare the frequency spectra of the cross-sectional profiles of coarse aggregate particles to a number of geometrically simple reference shapes, whilst Podczeck (1997) used measures of deviation from squares, triangles and circles in order to characterise powder particle morphology. Whilst these techniques are useful in determining and representing the underlying shape of a particle, it is not clear how useful they are in providing explicit measures of properties such as angularity. The most intuitive method would appear to be the mathematical morphology approach taken by Masad et al (2000), in that the resistance of a particle boundary to a series of erosion and dilation operations is directly dependent on the sharpness of the edges and corners. The primary weakness of this approach is that it lacks rotational invariance, in that the use of a simple square structuring element means that an image of a square particle with sides aligned with the axes of the grid would lose no area whatsoever.

In this paper we extend the mathematical morphology approach to three dimensions and show how scale, rotation and orientation independence can be attained by replacing the square structuring element with an ellipsoid that is adaptively determined by the size and aspect ratios of the particle. We discuss the relative merits of two-dimensional and three-dimensional imaging in the case of coarse aggregate and present an effective means of 3D data acquisition. In addition to the angularity algorithm we show how size and form can be recovered in a relatively straightforward manner. The limitations of this approach are discussed and opportunities for further work are identified.

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