

FACULTY OF BUSINESS, HOSPITALITY & HUMANITIES

Guidelines for Project Paper Master of Business Administration



MBA IN BANKING AND FINANCE
MBA IN MANAGEMENT
MBA IN MARKETING
MBA IN HUMAN RESOURCE MANAGEMENT

1.0 Introduction

The MBA Graduate Project, which is known as a mini-thesis is a compulsory project for the MBA students to complete at the end of their final semester. As such, students should regard their graduate projects as an ideal opportunity and vehicle for integrating what they have learnt during the MBA programme and applying these concepts and skills to a real problem at work. This note aims to provide students with a guide on how to go about the various stages of doing the project and also include information on the formal system devised by the University to supervise and assess projects

Module Status:

Number of credits: 7 credit hours

Level: Compulsory (specialization)

Pre-requisites:

Completion of 80% of the core modules of the programme including modules in Statistics and Decision Analysis and Research Methodology.

Assessment:

Research proposal, preliminary literature review and presentation (20%): to be prepared independently prior to the allocation of a dissertation supervisor.

Completed and submitted project paper (15,000 – 30,000 words) (80%)

Main References:

There is no set general text. Reading draws heavily on journal articles and book chapters, according to the research project topic being selected.

2.0 Objectives

The main objectives of the graduate project are as follows:

- 2.1 To provide students with an opportunity to draw together and integrate the knowledge gained and the skills developed from the MBA programme;
- 2.2 To provide students with an opportunity for independent study and to develop an ability to organize work with a view to achieve a specific goal;
- 2.3 To develop students with skills in business strategy, operations or in similar integrated activities appropriate and relevant to their organizations and their personal development needs and goals; and
- 2.4 To undertake an academic project based on sound management principles and intellectual reasoning.

3.0 Initial Project Proposal

To give a good foundation and in-depth knowledge on how to do an effective research, students are first required to register for the module in Research Methodology. Upon attending the course, students are expected to submit an initial project or research proposal of the project area to the Module Leader, BEFORE officially registering for the graduate project.

When considering the initial project proposal, students should look for a critical and analytical approach to the following:

- Specification of the goals of the project or research
- Outline of strategy and methodology for achieving goals
- Literature references with comments as to their relevance
- Identification of specific project topic and its relation to existing similar work
- Their understanding of the basic principles underlying the project
- Foreseeable problems and strategies for resolving them.

The initial project or research proposal comprises of three sections:

- Project / Research definition
- Investigation of Project Background
- Project Plan

The project plan is very important, of which students are assured to achieve the final project objective within a given time.

A student who intends to do case writing or corporate/business plan will have to furnish a provisional letter of approval from the selected case company prior to registering for the Graduate Project. Students will inform the selected case company the data and information needed for the report and request permission to do case study.

4.0 Project Paper Proposal Approval

The submitted initial Project Paper proposal will be reviewed by the Supervisor who will endorse the proposal to the Dean, Faculty of Business.

5.0 Appointment and Change of Supervisor

The Dean Faculty of Business will assign appropriate supervisors for students. Students are expected to work closely with the assigned supervisors. However, a student may request a change of supervisor provided that the request is done officially in writing to the Dean of the Faculty of Business.

A student who has been given a confirmation on a project and supervisor should proceed by meeting and discussing with the supervisor on the first draft report. It is highly recommended that students keep a project diary or a log book throughout the graduate project. At the very least, this should be checked against his or her weekly objectives and should contain details of what have been learnt and the time taken. A supervisor may ask a student to submit a weekly summary based on the diary or log book since these will provide the supervisor and the student progress of the project. Students will find it useful when it comes to writing the Final Project Report.

A student is required to fill up a record of consultation with his/her supervisor at the end of the consultation. The student needs to record the areas that are discussed and actions that need to be taken before the next consultation. The template for the record is in **Appendix M**.

6.0 Responsibilities of the Supervisors

- 6.1 100% evaluation of the Final Project Report
- 6.2 Advising and guiding the students on the overall direction of the project. Areas to be agreed include:
- 6.2.1 Aims of the project
- 6.2.2 Topic area
- 6.2.3 How it will be tackled/broad strategy
- 6.2.4 Project plan
- 6.2.5 Resources/facilities required
- 6.2.6 Student's strengths and weaknesses in the project area
- 6.2.7 Feasibility of project aims being achieved
- 6.2.8 Preliminary outline, literature/background research
- 6.2.9 Advice on style and format
- 6.2.10 Required academic standards
- 6.2.11 Foreseeable problems

7.0 First Draft Report

This draft is submitted to the supervisor based on the earlier comments or feedback received on the initial project proposal. The content and format of the report are as follows:

Chapter 1: Introduction

- Introduce the subject matter
- How significant the study
- Objective of the study
- Limitation to the study (ability to generalize to the population)

Chapter II: Literature review

- Past studies in the subject areas that you are researching
- Theory/concept/framework/model of study
- Hypothesis is not recommended

Chapter III: Research Methodology

- Data collection method
- Representativeness / issues of sampling
- How to conduct interview
- Describe the questionnaires
- Validity/reliability of the data
- Plan of analysis (roughly what you want to do)

The first draft project should be of reasonable length in total, EXCLUDING appendices, tables and charts. Students should be aware of the level of academic standard required in the graduate project. Students should also avoid from having too widespread scope of the area. To some extent, students should adjust the specific aim within the context of the level to work expected and the time available. It is preferable to constrain the scope so that the project can be completed without a large number of unanswered questions.

8.0 Feedback/Comments from the Supervisor

On receipt of feedback from supervisor(s), students will continue to proceed with revising the draft report. Students are expected to proceed and prepare their report in details by adding the following continuous required chapters:

Chapter IV: Results and Discussion

Chapter V: Conclusions

9.0 Submission of the Complete Project Paper

After revisions on the project paper, student will end with the final and completed paper, which is to be submitted directly to the respective supervisor for final evaluation. In any case, if there are minor corrections, students are instructed to revise and resubmit the paper before binding it with a hard cover. Please refer to **Appendix N** (Flow Chart for submission of draft).

Supervisors should only approve the hardbinding of project papers if they are satisfied that the formatting, organization, pagination, etc., of the project paper have met the specifications in the Project Paper Guidelines. Please refer to **Appendix O** (Approval for hardbinding). Supervisors submit final grade to Dean, Faculty of Business upon signing hardbound copies of the report.

Without the hardbound copies, the highest grade a supervisor can give to a student is a C+. Students should submit **Two (2)** hardbound copies of the project paper and 1 electronic copy on a CD to the following:

- 1. Supervisor
- 2. Dean, Faculty of Business

A student, with an approval from his or her supervisor, may publish a paper extracted from the graduate project, provided acknowledgement is given to the University. The project paper should be between 15,000-30,000 words (plus or minus 5%). Students intending to submit a graduate project exceeding the stipulated length must submit a written justification to the Dean, Faculty of Business through the Project Paper Supervisor, at least two months BEFORE the date of final submission.

10.0 Project Paper Evaluation

10.1 The MBA project paper is assessed as 100% coursework. Upon submission of the project paper. The submission of completed project papers is evaluated based on MBA Project Paper Marking Grid. Please refer to **Appendix L** for the assessment criteria.

11.0 Final Format of the Project Paper

A project paper should normally have the following three sections:

11.1 The Preliminary Pages include:

- a. Blank page
- b. Title page
- c. Copyright Page
- d. Declaration
- e. Acknowledgements
- f. Dedication (optional)
- g. Abstract
- h. Table of Contents
- i. List of Tables
- j. List of Figures, Illustration, etc
- k. Preface (optional)

11.2 The TEXT should normally be divided into chapters such as:

- a. Introduction
- b. Literature Review
- c. Research Methodology
- d. Results and Discussion
- e. Conclusion and/or recommendations

11.3 The REFERENCES consists of:

- a. Appendices (optional)
- b. References
- c. Glossary (optional)
- d. Notes (optional)
- e. Index (optional)
- f. Publication List
- g. Blank page

The various pages in a project paper should normally be arranged in the following manner:

- 1. Blank page
- 2. Title page (Counted as lower-case Roman numeral "i" but not numbered)
- 3. Copyright Page (always numbered lower-case Roman numeral "ii")
- 4. Declaration (numbered consecutively with a Roman numeral)
- 5. Acknowledgements (if any; numbered consecutively with a Roman numeral)
- 6. Dedication (if any; numbered consecutively with a Roman numeral)
- 7. Abstract (numbered consecutively with a Roman numeral)
- 8. Table of Contents (numbered consecutively with Roman numeral(s))
- 9. List of Tables (numbered consecutively with Roman numeral(s))
- 10. List of Figures, Illustration, etc (numbered consecutively with Roman numeral(s))
- 11. Preface (if any; numbered consecutively with Roman numeral(s))
- 12. Text (including introduction; first page always numbered with Arabic numeral "1"; pages numbered consecutively)
- 13. Appendices (If any; Arabic numerals, pages numbered consecutively with rest of text)
- 14. References (Arabic numerals, pages numbered consecutively with rest of text)
- 15. Glossary (if any; Arabic numerals, pages numbered consecutively with rest of text)

- 16. Notes (If any; Arabic numerals, pages numbered consecutively with rest of text)
- 17. Index (If any; Arabic numeral, pages numbered consecutively with rest of text)
- 18. Publication list (if any; Arabic numera, pages numbered consecutively with rest of text)
- 19. Blank pages

I. Preliminary Pages

1. Title Page

The form and contents of the title page must follow the format of the example given in **Appendix A**. Title should be capitalised and double-spaced. The month and year cited on the title page are the month and year of project paper submission. **The title page is counted as page "i", however, the number is not printed.**

2. Copyright

Please refer to the format **Appendix B.**

3. **Declaration**

Please refer to the format **Appendix C.**

4. Acknowledgement

This is a brief acknowledgement of assistance given to the author in researching and writing the project paper. Its page should be numbered with consecutive lower-case Roman numeral. Typeface to be used is Times New Roman font size 12.

5. **Dedication (if any)**

Typeface to be used is Times New Roman font size 12.

6. Abstract

This is a summary of the project paper, which will state the problem, the methods of investigation and the general conclusion. An abstract should be

approximately 300 words. Line spacing is one and half spacing. The paragraph after that should be Double-spacing. Typeface to be used is Times New Roman font size 12. Please refer to the format **Appendix D**.

7. Table of Contents

This must include entries for preliminary pages (copyright, abstract, dedication, and acknowledgement, lists of tables and figures, and preface), text (main divisions and subdivisions of the project paper), appendices, notes, references and index. Typeface to be used is Times New Roman font size 12. Please refer to the format **Appendix E**.

8. List of Tables

This provides the list of table numbers, full title and page numbers. Tables must be numbered consecutively in order of appearance. Typeface to be used is Times New Roman font size 12.

9. List of Figures

Figures (i.e. graphs, photographs and other illustrative material) are to be listed on a separate page. Number, title and page are to be given. Figures must be numbered in Arabic numerals consecutively (Fig 1,2,3 or 2.1,2.2,2.3, etc) in order of appearance and captioned. Typeface to be used is Times New Roman font size 12.

10. **Preface**

This is a brief explanatory statement of why the author came to study the subject of the project paper. Typeface to be used is Times New Roman font size 12.

II. Text

The first page of the text is always numbered Arabic numeral "1". Typeface to be used is Times New Roman font size 12. Text contains the chapters of the project paper, in logical order, and should normally include:

1. Introduction

Introductory chapter introduces the research background and problem statements that indicate their importance. It should also contain the research objectives, contribution to knowledge and brief description of the organisation of the project paper.

2. Literature Review

Critical review of literature related to the topic of the project paper meant to act as a base for the experimental/analytical section of the project paper. Literature selected must be relevant, up to date, analysed and synthesised logically. Review should contain critical evaluation and discussion of other related research.

3. Research Methodology

Methods and techniques used in the research. For social science, a theoretical or conceptual framework should be included. As for engineering and sciences, this may include, but not limited to, chapter or chapters which describe the theoretical development, hypothesis description, methodology, experimental design and standard procedure description. This section may be written in one or two chapters.

4. Results and Discussion

Data analysis presents a complete account of results and analyses of the study in the form of figures, tables or text so that the key information is highlighted. It may consist of more than one chapter depending on the number of experimental work and/or parametric studies conducted. Each chapter on Results should contain discussion, which discusses the results of the study in relation to the hypotheses and highlights the main findings, their significance and implications.

5. Conclusion

Summarises the findings of the study in line with the objectives set.

Please refer to **Appendix F** on the layout of the Chapter.

REMINDER:

The last paragraph of any page should comprise at least two lines of text. Any heading appearing near the bottom of a page should be followed by at least two lines of text. If this is not possible, the heading and the line should be continued in the next page.

If the last paragraph of a page has to be continued on the next page, there must be at least two lines of the text appearing on the next page.

III. REFERENCES

1. Appendices (Optional)

The pages should be numbered continuously with the rest of the text. Typeface to be used is Times New Roman font size is 10 with One and a half spacing.

2. References

Every reference quoted or cited in the project paper must be included in the list of references and numbered accordingly. References should be ordered alphabetically.

Please refer to **Appendix G** on the Citation style for references in text.

Please refer to **Appendix H** on the Citation style for reference list.

Please refer to **Appendix I** on the Formatting of Reference.

Typeface to be used is Times New Roman font size 10 with <u>one and a half spacing</u>. There should be <u>Double spacing between entries</u>.

3. Glossary

The pages should be numbered continuously with the rest of the text. Typeface to be used is Times New Roman font size is 10 with One and a half spacing.

4. Notes

The footnotes may be numbered consecutively throughout the project paper, or throughout each chapter.

Typeface to be used is Times New Roman font size 8 single spacing with a double spacing between entries.

12.0 SPECIFICATIONS FOR THE PROJECT PAPER

12.1 Number of Copies

A candidate is required to submit **FOUR** (4) hardbound copies of the project paper in **black buckram** and an electronic project paper to EU within the time frame stipulated by the Board of Examiners. A copy of the project paper will be placed in the Library and the respective Faculty.

12.2 Length of Project paper

MBA Project Paper: Should normally be within 15,000 - 30,000 words

Master Thesis: Should normally be within 20,000 - 60,000 words. Ph.D. Thesis: Should normally be within 40,000 - 100,000 words.

12.3 Language of Project paper

Project paper must be written in English with British spelling used throughout the project paper.

Final oral defence (viva-voce) will be conducted solely in English.

12.4 Typeface and Font Size

Typeface to be used is Times New Roman. The same typeface should be used throughout the project paper. Font size of 12 point should be used for the main body of the text, which should not be script or italic. Line spacing is one and a half spacing. The next paragraph should be Double-spacing and start with a paragraph indent of 12.7 mm. A laser or other high quality printer is recommended.

12.5 Paper

High quality bond paper A4 size, 80 g/m2 must be used for the two bound copies. This paper should be white in colour, acid free and "non-erasable" kind.

12.6 Corrections

Corrections of typographical errors, or changes in the text, figures or tables, must be made as cleanly and invisibly as possible. Correction fluid is not to be used. Corrections should be made on the original before recopying or reprinting the problem page.

12.7 Margins and Spacing

The margin on the document must measure according to the below specification:

Top - 20mm Left - 40mm Bottom - 40mm Right - 25mm

Text should be typed, one and a half-spaced, on one side of the paper only. All information excluding page numbers must be within the text area. All typing, print, illustrations, etc. should be on one side of the paper only.

12.8 Pagination

Page numbers are to be placed at least 15 mm from the edge of the page at the bottom centre of the page.

Every page except the title page must be numbered. Title page is "i" but is not numbered.

Preliminary pages are to be numbered in lower case Roman numerals (ii, iii, iv etc);

The text pages are to be numbered in Arabic numerals and all pages must be numbered consecutively and continuously, irrespective of volumes.

12.9 Covers and Binding

The project paper should be bound in black buckram with gold lettering

Typeface to be used is Arial Narrow

Font size to be used for: 18

12.9.1 Front Cover of the Project paper (Appendix J)

Title of project paper, name of candidate, degree awarded, name of university, and month & year of project paper submission should be in uppercase.

Spine of the Project paper (Appendix K)

Name of candidate, title of project paper, degree awarded and year of project paper submission should be in uppercase. Direction of lettering - run from the top of spine.

12.10 Photographs

Photographs should be black and white whenever possible. Pages containing photographs should be numbered as regular pages. When photographs are to be used, they are to be scanned. Using tape, glue or any type of adhesive to insert photographs is not acceptable. Pages with photographs should be copied on a colour photocopier.

12.11 Quotations

• Short quotations (less than 40 words) are incorporated into the text and enclosed by double quotation marks ("").

- Long quotations of 40 or more words are displayed in a double-spaced block of typewritten lines with no quotation marks. The APA suggests that you *do not single space*; however, some instructors will require that indented quotations be single-spaced, especially when quoting poetry, which loses some of its formal characteristics when double-spaced. Indent five spaces from the left margin and type the entire quotation on the indented margin *without* the usual opening paragraph indentation. If the quotation is more than one paragraph, indent the first line of the second and additional paragraphs five spaces from the already indented margin, approximately an inch from the left margin.
- If you have a quotation within a block quotation, enclose it in double (") quotation marks. If you have a quotation within a short quote (one incorporated within the text), enclose it within single quotation marks (').
- Ellipsis points are used to indicate omitted material. Type three periods with a space before and after each period to indicate omission within a sentence (...). To indicate an omission between sentences type a punctuation mark for the sentence followed by three spaced periods (...) (? ...) (! ...). Your word processing software probably provides especially typed characters that will create ellipses that will not be broken, inappropriately, at the end of a line.
- When a period or comma occurs with closing quotation marks, place the period or comma within the closing quotation mark. Put any other punctuation mark outside the quotation marks unless that mark is part of the quoted material.

12.12 Non-paper formats

12.12.1 Labels

- Author's name
- Degree date
- Copyright notice

12.12.2 Videotapes

- length of videotape (in minutes)
- silent or sound
- colour or black and white
- width of tape (e.g. 19 mm or 13 mm)
- programme segments
- format (e.g. NTSC, PAL, SECAM)

12.12.3 Computer disks*

- Operating system
- density
- hardware required (if appropriate)

^{*}All disks should be write-protected.

13.0 SUBMISSION OF PROJECT PAPER

Candidates intending to submit their project papers should comply with the following procedures:

- a) A candidate shall give three (3) months for Master's and six (6) months for Ph.D. notice of his/her intention to submit his/her project paper for examination in the prescribed form.
- b) On completion of the research, a candidate shall submit:
 - One copy of the comb-binded project paper to the Supervisor for assessment and comments.
 - After assessment by the Supervisor, the project paper is passed to a moderator assigned by the Dean/MBA Coordinator for his/her assessment and comment
 - Student to do the necessary corrections and improvement to his/her project paper and meeting the plagiarism requirement through Turnitin (max. 20% similarity) before submitting to Supervisor for final assessment.
 - Please refer to **Appendix N** (Flow chart submission of draft).
- c) A candidate shall submit to the Faculty of Business, **Two (2)** hard bound copies of the approved project paper and an electronic project paper within a week after final assessment of the project paper.

14.0 Extension of Submission of the Project Paper/Project paper

A student may seek extension for submission of the project paper by writing to the Dean, Faculty of Business/MBA Coordinator through his/her Project Paper Supervisor. In requesting for an extension, the student should state the reason/s why the extension is being sought or why the request should be approved.

The Dean/MBA Coordinator, upon the recommendation of the Project Paper Supervisor may approve the request for extension to complete the project paper, provided however that such extension should not be beyond one semester from the date of the initial final submission.

In the event the student fails to submit the completed project paper within the extension period, the student will have to register again for the Project Paper.

15.0 List of Supervisors

No.	Lecturer	Contact details
1.	Prof. Dr. Sivakumar Velayutham	011-23289045
	·	sivakumar@nilai.edu.my
2.	Dr. Chandramalar Munusami	+60129414166
		chandramalar@nilai.edu.my
3.	Dr. Gan Joo Kong	+60176990565
		jookong@nilai.edu.my
4.	Dr. Eddy Bala	+601123422605
		eddy.bala@nilai.edu.my
5.	Dr.Siti Aishah Binti	+60182238578
		sitiaishah@nilai.edu.my
6.	Dr.Nurhafizah Zainal	+60182136964
		drnurhafizah@nilai.edu.my
7.	Dr. Santhi a/p Govindan	+60172472637
		santhi@nilai.edu.my
8.	Ms.Nor Nazeranah Binti	+60176829201
0.	Wish to I vazeranan Dinti	nornazeranah@nilai.edu.my
9.	Mr. Vigneswararao	012-3390025
'	Wife Vigites warardo	vigneswararao@nilai.edu.my
10.	Ms Tanusia Arumugam	+60126030775
		tanusia@nilai.edu.my
11.	Mr. Pramananthan Vasuthevan	019-2581918
		pramanathan@nilai.edu.my
12.	Ms Mary Pang	+6012-2308395 /
		marypang@nilai.edu.my
13.	Mr.Muzaini Bin Osman	+60193346892
		muzaini@nilai.edu.my
14.	Mr.Mohd Najib Bin Abd	mdnajib@nilai.edu.my
	Č	- Indiragio Cimanodamy
15.	Mr.Lim Chan Chee	+60146296689
		cclim@nilai.edu.my
16.	Mr.Khairi Faiz Bin Mazri	+60162881252
		kf.mazri@nilai.edu.my
17.	Ms.Mahalasmi	+60163341520
17,		
10	M: 'G ' All ID '	mahalasmi@nilai.edu.my
18.	Mimi Suriaty Abdul Rani	msuriaty@nilai.edu.my
19.	Sujatha Balakrishnan	+60196541815
		sujatha@nilai.edu.my

16.0 Recommended Project Paper Timetable

No.	Week/Date	Activity	Assignment	Comments
1	Week 1-3	REGISTRATION FOR GRADUATE PROJECT PAPER	Submission of Initial Project Proposal to Module leader (e.g. based on proposal from Research Methodology course)	Please make an appointment with your supervisor for further discussion
2	Week 4-6	Meeting with supervisor on the first draft	Discussion on the first draft paper based on the comments received from the supervisor on the Initial project proposal.	
3	Week 7-9	Prepare first draft copy based on the given comments	Write first draft to submit to supervisor	If you have not decided on a topic by this time, you may consider withdrawing from the course
4	Week 9	SUBMISSION OF THE FIRST DRAFT	Submission to Supervisor	The draft paper should cover three chapters (as stated in the guidelines) for comments from the supervisor
5	Week 10- 11	Meeting and discussion with supervisor	Supervisor sends feedback/ comments on the first draft.	
6	Week 12- 13	Revise the draft paper based on the given comments		
7	Week 14	Due Date: SUBMISSION OF THE FINAL DRAFT PROJECT PAPER (2 copies)	Submission to Module Leader / Supervisor	
8	Week 15	Supervisor SUBMITS PROJECT PAPER to the Dean, Faculty of Business		Dean, Faculty of Business assigns Research Examiner (2 nd examiner)
9	Week 16 - 18	2 nd Examiner Reviews and makes comment/suggestions		Student amends report Accordingly
10	Week 19	Due Date: SUBMISSION OF A COMPLETE PROJECT REPORT	Student submits two (2) hardbound copies of project report and 1 electronic copy on a CD to Supervisor / Module Leader	Student to submit to Turnitin to meet plagiarism rule of not more than 20% similarity before hardbinding.
11	Week 20	Final Grade from supervisor and 2 nd examiner	Supervisor: • Submits final grade to the Exam Unit together with two (2) bound copy of the project paper • Submits two(2) hardbound copies of the project Paper	The Project Paper shall be kept in the MBA Programme Resource Room for exhibit and other relevant purposes.

	to Dean, Faculty of Business Faculty AA keeps copies in Faculty Resource Room Selected copies to be kept in Library	The softcopy of the Project paper shall be kept by the Faculty of Business/Librarian for future references (e-journal publications, etc.)
--	--	---

APPENDICES

Guidelines

1) Appendix A - Project paper Title page

2) Appendix B - Copyright page
 3) Appendix C - Declaration page
 4) Appendix D - Abstract page

5) Appendix E - Table of contents page
 6) Appendix F - Layout of Chapter

7) Appendix G - Citation Style for Reference in Text 8) Appendix H - New Citation in Reference List

9) Appendix I - Formatting of Reference

10) Appendix J - Front Cover

11) Appendix K - Spine of Project paper

12) Appendix L - MBA Project Paper Marking Grid

13) Appendix M - MBA Project Paper Consultation Feedback Form

14) Appendix N - Flow chart of Project Paper submission
15) Appendix O - Approval form for hard-binding of Project

Paper

PROJECT PAPER TITLE

BY

AUTHOR'S NAME

PROJECT PAPER SUBMITTED IN FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION BANKING AND FINANCE

in the

Faculty of Business

NILAI UNIVERSITY

MALAYSIA

YEAR

The copyright of this project paper belongs to the author under the terms of the Nilai University Intellectual Property Regulations. Due acknowledgement shall always be made of the use of any material contained in, or derived from, this project paper.

> © Name of candidate, Year of Project paper submission All rights reserved

Appendix C

DECLARATION

I hereby declare that the work has been done by myself except quotation and citations, which have been duly acknowledged, and no portion of the work contained in this Project paper has been submitted in support of any application for any other degree or qualification on this or any other university or institution of learning.

Author's name

Date:

ABSTRACT

A Microwave Anechoic Chamber has been developed at the Department of Engineering, Nilai University, for monostatic and bistatic radar cross section measurements. The structure of the chamber is a quarter section geodesic dome with a 12-foot radius and raised 3 feet above the floor. An antenna railing system is installed inside the chamber. It consists of 6 rails, 30 degrees apart in azimuth angle around the dome. The antennas can be moved along the rails in the elevation direction, with the microwave beam pointing at the centre of the dome where the target is located. This design enables a very large combination of incident and scattering angles in bistatic measurements. Four transmit antennas are fixed at different elevation angles next to one of the antenna rails. Using an azimuth-over-elevation positioner as the pedestal for the target, and by positioning the movable antenna along that rail beside those fixed transmit antennas, monostatic measurements with incident angles ranging from 0° to 90° can be accomplished.

A vector network analyser is utilised to measure the amplitude and phase of the radar returns. GPIB interface bus is used to control various hardware components as well as to perform data acquisitions. A computer program has been written to automate the measurement system. Data are stored in raw format and processed later with a dedicated software so that different processing methods and parameters can be applied. The broadband measurement allows the conversion of frequency-domain data to a band-limited impulse response of the target of interest. Time-domain gating technique is used to remove the spurious signal in the time neighbourhood of the target.

A number of monostatic calibration techniques have been considered. The Isolated Antenna Calibration Technique (Surname, Year) is used in the study to certify the measurement accuracy, polarisation isolation performance, time stability as well as the total system sensitivity. Some bistatic calibration techniques available in the open literature are also reviewed. The Conducting Sphere Calibration

Technique (Surname, Year) is selected to evaluate the bistatic performance of the measurement system.

An extended target with randomly distributed vertical dielectric cylinders over a metallic ground plane has been fabricated. Although the radar range does not satisfy the far field criterion, a technique to measure such target at short distance has been utilised and the measurement results are compared with calculations from a theoretical model by Karam et. al. (Year).

The quietness of the anechoic chamber is also evaluated using the Free Space Voltage-Standing-Wave-Ratio field probe technique. An alternative method to derive the reflectivity level at the quiet zone is proposed. This method has the advantage that the reflectivity level can be calculated directly from the recorded standing wave curve in contrast to the conventional method, which requires the use of a tabulated graph. Nevertheless, it gives a result, which generally indicates a poorer performance, which means that a more stringent evaluation can be obtained.