

The Final Project

at the International MBA Program of the Centre for Management Training

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Abstract

This document describes how the final paper should look like, what its content should be and what its goal is. The final paper is a well documented study that investigates a complex choice and investigates its possible solutions. As a complex problem we understand one that is not only solved by unambiguous mathematics: a problem that has no clear best solution but each solution is a compromise in itself (such as “best quality but worst price”). The aim of the work is to apply one of the Multi Criteria Decision Analysis methods (which are described in a separate document).

About Philippe J.S. De Brouwer

Dr. Philippe De Brouwer studied theoretical physics and later acquired a second Master –Business Engineer– while working full time. Finishing this Master he solved the “fallacy of large numbers puzzle” that was formulated by P.A. Samuelson 38 years earlier. In this Ph.D. he successfully challenged the assumptions of the Noble price winning “Mean Variance Theory” of H. Markovitz that dominated our thinking about suitability of investments for more than 60 years.

In the start of his career he moved from insurance to banking focusing and from IT to asset management. For Fortis (BNP) he helped the young investment management company grow, stood at the cradle of one of the first capital guaranteed funds and got promoted to director in 2000. In 2002 he moved to KBC where he merged 4 companies and became CEO of the merged entity in 2005. Under his direction the company climbed from number 11 to number 5 on the market. In the aftermath of the crisis he helped creating a new investment management company for KBC in Ireland that soon accommodated the management of ca. 1000 investment funds and had about 24 Bln Euro under management. In 2012 he widened his scope to financial risk management and specializing in statistics, analytics, data and numerical methods.

In 2015 Philippe worked for the Royal Bank of Scotland Group as head of Analytics Development and now is director at HSBC Group and oversees the Independent Model Review Centre of Excellence.

Philippe also found a passion in coaching on team leadership and teamwork as well as teaching (mainly for Vlerick Business School and the University of Warsaw).

1 Practical Information

Questions?

contact

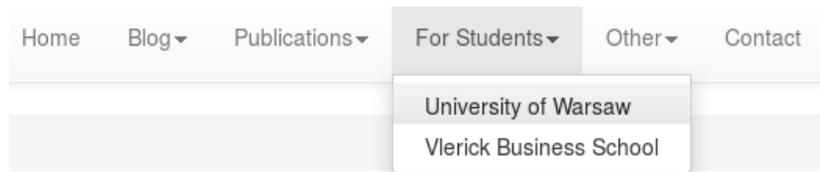
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Availability of Slides

...and eventually other materials

1. url: <http://www.de-brouwer.com>
2. select “For Students” and then “University of Warsaw”



3. locate your program
4. locate the relevant course and download your materials

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2 The Final Project Itself

2.1 The Aim of the Final Project

Aim

The Aim of the Final Project

The Aim

Demonstrate Your ability of making a decision concerning a particular situation which requires change. Otherwise stated: formulate a well defined and quantified business decision.

Steps required:

1. formulate the problem diagnosis,
2. explore alternatives,
3. decide,
4. propose a decision.

2.2 The Content of the Final Project

Content

The Content of the Final Project

1. Titlepage:
 - University of Warsaw, Faculty of Management, Centre for Management Training (CMT), International MBA Program
 - TITLE
 - YOUR NAME
 - Warsaw, DATE
2. Abstract / Executive Summary
3. Table of Contents

4. Introduction: frame the problem (what company, what issue, etc.)
5. Problem Statement
 - Description of the particular issue,
 - Formulating of the diagnosis (what is wrong/to be improved/etc?),
 - Identification (definition) of a decision-making problem,
6. Finding a Solution
 - Alternatives (variants) of problems solution;
 - Criteria of alternatives selection,
 - Assessment of the particular alternatives with respect to the quantified procedure which involves criteria, their significance and scaling grade of particular alternatives;
 - Choice of the best alternative;
7. Outline of its application and recommendation to the company.
8. Bibliography

Note: Of course you can adapt this to your particular situation.

Confidentiality

It is good to choose a subject from your own experience, it is better to do something for a real open question in your company and it is best to agree with your management what the subject could be ... but

- Inform Philippe De Brouwer if the document contains confidential or privileged information.
- Especially inform me on the type of person that should not read your document.
- If necessary (but only as last resort) you may divulge the name of the company.

How to Choose a Subject

The university's requirements are simple: it should involve change and a difficult decision. We repeat: "It is good to choose a subject from your own experience, it is better to do something for a real open question in your company and it is best to agree with your management what the subject could be"

Question(Examples)

Who has any suggestion or idea?

2.3 Formal Aspects

Introduction

Formal Requirements

- title page, including abstract: 1 A4 page (best a few lines)
- the project itself: ca. 20 pages (A4, 11pt, etc.)
- the content prevails over the form and all of the above
- the project is **an individual work**, however I encourage you to collaborate and create small teams to enhance the quality of your works—for the first exploring steps—(but mind confidentiality!)

The idea is that the abstract could serve as a board paper and the project itself as the supporting materials for a (supervisory) board.

Preliminary Timeline

- *December 17* • 16:30–17:30: Introduction
- **January 30**: second seminar – all theory
- **January 31**: approval of project by Philippe De Brouwer
- *February*: individual coaching
- **March 15**: pre-submission of the project and abstract to Philippe
- *April*: individual coaching
- **May 15**: project submitted to the secretary of the CMT and Philippe De Brouwer
- **June TBD**: Capstone Exam

Evaluation

The evaluation will primarily be based on the following:

- **clarity of conveying the message** / ability to convey analysis and synthesis
- the **identification of the problem** to be solved (did we find the main problem?)
- the **approach** (strategy followed to solve the problem),
- the **selection of the solution** (using the WSM—see slide pack on MCDA—is sufficient),

-
- **professionalism:** of course no plagiarism is allowed, sources should be referenced correctly (choose one style, but stick to it — see e.g. the bibliography on slide 28), make clear when conjecturing and when citing sources, define acronyms(!), ...
 - the **presentation** (clear, correct, not distracting, etc.), correct use of English, logical flow of ideas, ...

3 the Art of Decision Making

3.1 What and Why

What is a Manager?

Why do you follow this course?

Question

What defines a good manager?

Typical Tasks of a Manager

- Planning \Leftarrow DECISION MAKING
- Organizing
- Leading
- Controlling

What is a Decision?

Definition 1 ∴ Decision in Management Science ∴

A decision is a choice between multiple alternatives and then committing to the course of action

Types of Decisions

- Uniqueness
 - **Programmed Decision:** occurred often so rules exist
 - **Non-Programmed Decision:** the situation is unique (often poorly defined and largely unstructured, but with huge impact)
- Environment
 - **Certainty:** full information available
 - **Risk:** the future outcomes are uncertain

3.2 Identifying the Problem

Exploratory Methods

SWOT analysis

- Strengths
- Weaknesses
- Opportunities
- Threats

A Naive Solution

Cost Benefits analysis

for all solutions i , calculate the “total benefit” =

$$TB_i = benefits_i - costs_i$$

$$NPV_i = \sum_{t=0}^N \frac{cf_{i,t}}{(1+r)^t}$$

Then select the solution with the highest NPV

Question

Why is that a naive solution in the real world?

3.3 The Content of the Paper

General Idea

The Content of the paper ...

- corresponds to the main steps in a managerial decision process
- should be complete (contain enough information so that everyone can understand why what solution is preferred)
- should be as concise as possible

STEP 1: Identifying the Problem

What Problem Do We Want to Solve?

Example 1

Small broker is faced with losses in 2007—2009

Hints:

1. typically there is “one main problem”: the strategic objective,

2. start from a concrete issue or question and map possible causes (brainstorming)
3. avoid mixing problems, solutions and strategies
4. use brainstorming, teamwork, SWOT analysis ... be creative (for the assignment work in small groups of 3 to 5 people!)

Where is the problem

Problem Definition

Monsen and Downs (1965) propose different levels of decision making, with each their own agenda. Roughly translated to today's big corporates, this boils down to:

1. **Super-strategic:** mission statement (typically the founders, supervisory board and/or owners)
2. **Managerial Control / strategic:** typical the executive management (executive committee)
3. **Operational Control / tactical:** typical middle management

Note: Besides those definitions is it commonplace to re-use the concepts at different levels. So be careful how the words are used.

Note: Note that these levels roughly correspond to different time frames of change: the super-strategic level should change when the company and/or market changes dramatically, the strategic level every few years, the tactical can range from month to year.

STEP 2: Short-List Solutions

Find different strategies that all make sense

Hints:

1. map "cost-benefit", and eliminate non-efficient solutions,
2. eliminate non-ethical and non-legal solutions,
3. this step is not yet "exact science" (order of magnitude approach will do)
4. this step should end with a list of possible "actions" (or projects, solutions, alternatives)
5. also this step can be teamwork (in reality it is, there should be buy-in)

STEP 3: Identify Objectives

What do we really want to achieve? (strategic objectives)

Hints:

1. while this step is not strictly following step 2, it can draw inspiration on step 2,
2. this implies that these objectives are rather “tactical”
3. this step is not yet “exact science” (order of magnitude approach will do)
4. this step should end with a list of possible “objectives” (or projects, solutions, alternatives)
5. also this step can be teamwork (in reality it is, there should be buy-in)

STEP 4: Define Criteria

How will we measure how good solutions of step 2 fit the tactical objectives of step 2 and the strategic objective of step 1?

Hints:

1. can everything be translated to “money” (present value?)
2. think KPI, ie. try to find measurable things from which you hope that if all satisfied the tactical and strategic objectives will benefit,
3. this is also no exact science but it should be as “complete” as possible: ask yourself “if all this is satisfied, should we be on the right track?”
4. every measure should be measurable! (even qualitative!)
5. you will need at least an ordinal scale (see slide next slide pack)

STEP 5: Compare the Alternatives

Use a Multi-Criteria Decision Method

See the slide pack “Multi Criteria Decision analysis”

STEP 6: Write Recommendation

- connect back to step 1 (the problem definition)
- provide the rationale
- provide confidence
- conclude

STEP 7: Finish in Beauty

- list citations
- an index could be nice too

4 Appendices

4.1 General Guidelines for Writing a Scientific Papers

General Guidelines for Writing a Paper

Correct scientific writing is the basis of the scholastic method and an important tool to avoid plagiarism.

- Write for a person who knows about the field but does not already know what you did.
- In addition to the content, pay attention to the writing style and format. As a general rule scientific papers are written to help the other scholar in his/her own research (it is no goal in itself to encourage people to read it by eg. hiding the results somewhere in the text).
- Consider the following sections for a standard research paper –reporting on experimental research.
 1. The **abstract (or executive summary)** is a summary of the entire paper. The abstract should as succinct as possible describe the question posed in the paper, the methods used to answer this question the results obtained, and the conclusions. The abstract should be a true summary that gives the reader who is not interested in the details all necessary information it is **not** something to encourage the reader to read all the rest!
 2. **Introduction.** The Introduction should
 - (a) describe the question tested by the experiments described in the paper,
 - (b) explain why this is an interesting or important question,
 - (c) describe the approach used in sufficient detail that a reader who is not familiar with the technique will understand what was done and why, and
 - (d) very briefly mention the conclusion of the paper.
 3. **Materials and Methods.** The Materials and Methods section should succinctly describe what was actually done. It should include description of the techniques used so someone could figure out what experiments were actually done. The details of a published protocol do not need to be reproduced in the text but an appropriate reference should be cited – e.g., simply indicate “were done as described

by Markowitz et al. (1952)". Any changes from the published protocol should be described. It is not appropriate to indicate volumes of solutions added instead indicate the relevant information about the experiment such as final concentrations used, etc.

4. **Results.** Begin each paragraph with an opening sentence that tells the reader what question is being tested in the experiments described in that paragraph. Write the opening sentence in bold font for emphasis. (Sometimes a complete sentence is used and sometimes a short phrase is used – either style is OK but the style should be used consistently throughout the manuscript.) Any results that include multiple data points that are critical for the reader to evaluate the experiment should be shown in tables or figures. However, the results should be summarized in accompanying text. Your paper should focus on what worked, not things that did not work (unless they didnt work for reasons that are interesting and provide insight)
 5. **Discussion.** Do not simply restate the results – explain your conclusions and interpretations of the Results section. How did your results compare with the expected results? What further predictions can be gleaned from the results?
 6. **References.** It is essential to credit published papers for work mentioned in your manuscript. There are a variety of ways of citing references in the text – the style used depends upon the policy of the journal. For an example of a commonly used example, see Instructions to authors on ASM web site (<http://jb.asm.org/misc/ifora.shtml>) or examples from published manuscripts. In text citations should refer to reference list. Do not rewrite title of references in text.
- **Format.** Certain general rules are commonly followed in scientific writing.
 1. **Flow.** Readers interpret prose more easily when it flows smoothly, from background to rationale to conclusion. Dont force the reader to figure out your logic clearly state the rational. In addition, it is much easier on the reader if you explicitly state the logic behind any transitions from one idea to another.
 2. **Abbreviations.** Use standard abbreviations (hr, min, sec, etc) instead of writing complete words.

Define all other abbreviations the first time they are used, then subsequently use the abbreviation. As a general rule, do not use an abbreviation unless a term is used at least three times in the manuscript. With two exceptions (the degree symbol and percent symbol), a space should be left between numbers and the accompanying unit. In general, abbreviations should not be written in the plural form (e.g. 1 ml or 5 ml, not mls).

It is a very good idea to add at the end a section “Nomenclature” or “Abbreviations” (note: this does not replace the definition when first used)

3. Tables and Figures.

- (a) When referring to a particular **table or figure**, they should be capitalized (e.g., Table 1, Figure 6, etc.) The text of the Results section should be succinct but should provide the reader with a summary of the results of each table or figure. Not all results deserve a separate table or figure. As a rule of thumb, if there are only a few numerical results or a simple conclusion describe the results in the text instead of in a table or figure.
- (b) All tables and figures should be put into a contextual framework in the corresponding text. A table of strains used should be mentioned in the Materials and Methods section, a table of results should be summarized in the Results section, a figure showing a diagram should be described in the Discussion section, etc. Tables and figures should present information in a format that is easily evaluated by the reader.
- (c) A good rule of thumb is that it should be possible to figure out the meaning of a Table or Figure without referring to the text.
- (d) Tables and figures should typically summarize results, not present large amounts of raw data. When possible, the results should provide some way of evaluating the reproducibility or statistical significance of any numbers presented.
- (e) Tables should be sequentially numbered. Each table should have a title (shown above (or below) the table) that describes the point of the table. For example, “Table 1. Overview of a Decision Matrix.” If necessary to interpret the table, specific descriptions about what a result represents or how the results were obtained can be described in a legend below the table.
- (f) Figures should be sequentially numbered. Each figure should have a title (shown below the figure) that describes the point of the figure. For example, “Figure 1. Graphical presentation of the efficient frontier.” If necessary to interpret the figure, specific descriptions about what a result represents or how the results were obtained can be described immediately following the title.
- (g) Tables and figures may be printed on separate pages that follow the Reference section. Alternatively, the tables and figures may be integrated into the paper if you are using a page layout program (such as LaTeX). However, if they are integrated into the paper make sure that there is not a page break in the middle of a table or figure.
- (h) Do not wrap text around the outside of tables and figures: if the

results are important enough to show as a table or figure they should stand out on the page, not be buried in text.

4. **Past, present, and future tense.** Results described in your paper should be described in past tense (you have done these experiments in the past, but your results are not yet accepted “facts”). Results from published papers should be described in the present tense (based upon the assumption that published results are “facts”). Only experiments that you plan to do in the future should be described in the future tense.
5. **Third vs first person.** It is OK to use first person in scientific writing, but it should be used sparingly – reserve the use of first person for things that you want to emphasize that “you” uniquely did (i.e. not things that many others have done as well). Most text should be written in the third person to avoid sounding like an autobiographical account penned by a narcissistic author. However, it is better to say “It is possible to ...” than to say “One could ...”. Writing that uses the impersonal pronoun “one” often seems non-committal and dry. In addition, inanimate objects (like algorithms, machines, etc.) should be described in third person, not with anthropomorphic or possessive terms (e.g., instead of saying “its att site”, say “the chromosomal att site”).
6. **Empty phrases.** Avoid using phrases that do not contribute to understanding. For example, the following phrases could be shortened (or completely deleted) without altering the meaning of a sentence: “the fact that ...” (delete); “In order to ...”(shorten to simply “To ...”). Likewise, the title of a table of results does not benefit from the preface “Results of ...”. In short, dont use more words than you need to make your point.
7. **Be Specific.** If several expressions modify the same word, they should be arranged so that it is explicit which word they modify. It is common to use a pronoun such as it or they to refer to a concept from the previous sentence. This is OK as long as there is only one concept that “it” or “they” means. However, if there are more than one concepts it is easy for the reader to get confused about what the pronoun is meant to specify (even if you know which one you mean). It is better to error on the side of redundancy by repeating the concept in subsequent sentences, than to take the chance of confusing the reader. Dont make the reader guess what you mean.
8. **Parentheses.** Avoid double parentheses. For example, “Three gene products catalyze reactions in the pathway for proline biosynthesis (Figure 1) (3)” could be reworded to say “Figure 1 shows the three reactions of the pathway for proline biosynthesis (3).”
9. **Proofreading.** Always spellcheck your paper and carefully proof-read your paper before submission. In addition to checking for errors and typos, read your paper to yourself as if you were reading

it out loud to ensure that the wording and sentence construction is not clumsy.

- **Further Sources**

- **Scientific Writing Booklet:** <http://cbc.arizona.edu/sites/default/files/marc/Sci-Writing.pdf>
- **A Guide To Scientific Writing:** http://openwetware.org/images/6/69/Guide_to_Scientific_Writing.pdf
- **Writing the Scientific Paper** <http://writing.colostate.edu/guides/guide.cfm?guideid=83>

Bibliography

Bibliography

References

De Brouwer, P. J. S. (2012). *Maslowian Portfolio Theory, a Coherent Approach to Strategic Asset Allocation*. Brussels: VUBPress.

Monsen, R. J. and A. Downs (1965). A theory of large managerial firms. *The Journal of Political Economy*, 221–236.

4.2 Nomenclature

Nomenclature

Nomenclature

cf cash flow, page 7

N a bounded or non-bounded natural number, page 7

r the discount rate, page 7

t a counter, page 7

alternative in a MCDA context one of the possible choices (used as interchangeable with “solution”, page 3)

choice in a MCDA context it can be used as interchangeable with “alternative” and “solution”, page 3

KPI Key Performance Indicator, page 9

MCDA Multi Criteria Decision Analytics, page 6

NPV Net Present Value, page 7

solution in a MCDA context it is one of the possible choices (used as interchangeable with “alternative”, page 3)