JACOBS
UNIVERSITY

BACHELOR THESIS IN INDUSTRIAL ENGINEERING AND MANAGEMENT

– Guidelines –

Class of 2018

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1. PURPOSE OF THE THESIS PROJECT

The bachelor thesis is the first own scientific work of a student. Its purpose is to let the student show his or her mastery of the contents, theories and methods of the major. Essential part of the work is to review and summarize relevant findings in research and to contribute with new own findings to research. According to this, relevant aims for the thesis are to contribute to industrial engineering and management (IEM) practice and research by writing a thesis that is based on current theoretical approaches in the fields of management and engineering (depending on the subject). An important aim of the thesis is to develop a methodological framework that is up to current research standard and supports the structure of the thesis. A high theoretical and methodological standard is essential for writing a thesis that can contribute to IEM research and practice because it enables to generate findings that are not out of the blue, but take current research to the next step. Additionally, the bachelor thesis serves as a showcase for students' future careers in academia and industry. The thesis project comprises the preparation of the thesis as well as the thesis seminar.

2. FINDING A TOPIC

2.1 TOPIC

To find a topic for the final thesis different options are available:

a) Students can apply for a topic proposed by the IEM faculty.

b) Students can propose a topic to one of the IEM faculty members:

   1. a topic based on current IEM research and practice,

   2. a topic based on the internship,

   3. a topic from industry.

If a topic is proposed by the student (b), the student should get in contact with the prospective supervisor as soon as possible. Furthermore, in case of collaboration with industry (b2. and b3.), the company must provide a co-supervisor.

2.2 CONFIDENTIALITY ISSUES

In general, the thesis is a document that can be made publicly available. In case confidential data is used, the student must ensure that permission to publish the required data is granted before starting the thesis project. It is the student's responsibility to ensure that the prospective supervisor is informed about all potential restrictions on data.

2.3 PROPOSAL

The supervisor must approve the thesis topic. In consultation with the prospective supervisor the student has to write a proposal for the thesis topic.

The proposal has to contain:

- Title of the thesis,

- Outline of the thesis,

- Problem description and its relevance,

- Research aims of the thesis,

- Planned course of research,

- Methodological framework / approach

- A list of literature relevant to the topic, and

- A timetable.

After approving the proposal, each student will meet with his or her supervisor while writing the thesis as it is considered to be necessary by both.

3. THESIS SEMINAR

The thesis project will be accompanied by a thesis seminar which provides students with general information and which serves as a forum for discussion with other students.

The thesis seminar will be held in several sessions including:

- a kick-off meeting

- a session introducing students into technical skills required for thesis writing

- a poster presentation of the thesis proposal

- a poster presentation of the final results.

Attendance at all meetings is mandatory (see Section "Important Dates" for the schedule).

4. THESIS WRITING

4.1 CONTENTS

A typical thesis contains the following parts in the given order:

- Title page

- Foreword (optional)

- Table of contents

- List of figures

- List of tables

- List of abbreviations

- Abstract

- Introduction

- Main text

- Conclusions

- Appendix

- Table of references

- Affidavit

Detailed instructions on how to format the different parts of the thesis and which ones are necessary or mandatory can be found in the provided style sheet.

4.1.1 FOREWORD
A foreword before the text of the thesis is optional. The foreword only includes personal remarks of the author (e.g. reasons for the chosen topics, help you have had, or difficulties you had to face, acknowledgements).

4.1.2 ABSTRACT
The abstract gives a summary of the thesis and contains the main research question, an overview over the methodology used, and the main findings. The abstract must not exceed one page.

4.1.3 INTRODUCTION
The introduction provides the reader with a motivation for the research topic, remarks about the objective and the aims and gives an overview over the organisation of the remaining thesis.

4.1.4 MAIN TEXT
The main text contains the methodology and the findings.

4.1.5 CONCLUSIONS
The final considerations should contain a summary of the core findings and some remarks about future research needs and implications for practice.

4.1.6 APPENDIX
The main text must contain all information required to understand the content of the thesis. Additional materials like data from empirical work or literature synopses may be included in the appendix if they are essential for the validation of information or the reproduction of experiments.

4.2   FORMAL REQUIREMENTS

4.2.1   GENERAL

The different parts of the thesis (chapters and sections) have to be labeled with the numbers of the pages within the table of contents. They have to be identical with the ones used in the text (cf. table of contents of this document).

4.2.2   CONTENT

The structure of the topic should illustrate in which way the topic was understood and how it has been addressed in the thesis by the author. Therefore, it should give an insight into the logic of the thesis and has to give a first impression about the content of each chapter. It is important to show the logical train of thought at this point. The formulation should label each chapter shortly but precise.

4.2.3   FORM

A formal and logical outline of the thesis also facilitates and demonstrates a logical train of thought. Chapters that are on the same level within the structure should have a similar range and should contribute to the same overarching problem (e.g. the chapters 2.4.1 and 2.4.3 should both contribute to the problem within point 2.4 and they should have a similar weight). Within the outline one should never have a single chapter on one level (e.g. if 1.1, 1.2 is mandatory as well). In order to ensure the readability the structure should not be too detailed. The formal aspects of the table of contents are explained in detail in the style sheet.

4.2.4   ABBREVIATIONS AND SYMBOLS

Abbreviations can be used but not too extensively. If used, only abbreviations that are available in Standard English Dictionaries are allowed. Abbreviations out of laziness are not allowed. Abbreviations that are used within the research context are also allowed and can be used but have to be explained in a list of abbreviations.

Within the thesis uniform symbols should be used. Symbols from external sources can be used if they are adapted to the notation used in the thesis. Exceptions to this are direct citations. Symbols should be inserted into a list of symbols like it is done with abbreviations.

The lists of abbreviations, symbols and formulas help increasing the readability of the thesis for the reader, because they provide the reader with the opportunity to look up the meanings of abbreviations, symbols and formulas.

4.2.5   CITATION OF EXTERNAL SOURCES AND QUOTATIONS

Citing in an appropriate manner is a sign of good scientific practice. Every use of external intellectual property has to be marked by the use of exact citations. Citations should be identified in footnotes. Footnotes should have an ongoing numbering and should be indicated by superscript. For example:

Within the systems theory, systems are composed of different subsystems.[1]

Direct citations have to be put into quotation marks. These citations require accuracy in every letter. Changes to the original should, therefore, be clearly indicated by brackets and the addition "annotation of the author". Accentuations within the original should be retained. If something is left out, it has to be indicated by three points "…". A direct citation should normally not exceed 2 – 3 sentences. If longer direct citations are not avoidable, please indent the citations and write single-spaced. An indirect citation is when you cite not word by word but the idea/sense of another thesis or paper. In these cases the quotation in the footnote has to start with cf. (compare for). It has to be indicated clearly where an indirect citations starts and ends; therefore, it can be useful to introduce the indirect citation with a short sentence. For example: As DAFT indicates the … If authors are mentioned with their name please use `small capitals`. If there is a citation within a citation this has to be indicated by apostrophes ('…').

On principle the original text has to be cited. Only if the original text is not accessible, it can be quoted by secondary literature. These cases have to be indicated by the phrase 'cited by' and include not only the data of the original text but also the data for the secondary source. Overall with every citation it has to be checked whether it is used in the sense intended by the original author and that the sense is not falsified by using only an excerpt

4.2.6 FOOTNOTES

Footnotes have to be separated from the rest of the text by a short line. They have to be treated like sentences and therefore to be ended by a full stop. Single footnotes are to be written single-spaced with 1.5 spaces between two footnotes. In case the quotations in the original text are on more than one page, this has to be indicated by using "pp." (e.g. pp. 2-10.). Footnotes have to be formatted according to the "Harvard Style" which is included in all established citation programs. For writing your thesis it is recommend using "RefWorks" as a citation program, which is provided by Jacobs University Library (http://www.jacobs-university.de/library/).

4.2.7 REFERENCES FOR FIGURES

All figures and tables that are inserted into the thesis have to be numbered according to their appearance in the text. (Figure 1, Figure 2, Table 1, Table 2, Figure 3, …). If the figures are from external sources or based on the figure of some other author, this has to be indicated by inserting the reference. The style sheet provides more detailed instruction. It is highly recommended to design own figures.

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[1] Cf. (Daft 1983), p. 33.

4.2.8 TABLE OF REFERENCES

All materials, which have been used for writing the thesis, have to be listed in the list of references. This includes not only sources that have been cited in the text, but also any other sources, which have been utilized during the thesis writing. In some cases, when a lot of materials from a specific literature type have been used, it may be useful to split the list, for example when judicial decrees are cited.

The table of references has to be formatted according to the "Harvard Style".

4.2.9 AFFIDAVIT

At the end of the thesis a declaration of good scientific practice has to be inserted. The declaration has to be signed by the author of the thesis. The text of this declaration is as follows:

> Herewith I declare that I have written the present thesis on my own and without the use of other than the indicated support.
>
> Passages that I have adopted, whether in sense or literally from other published or non-published works have been marked as such.
>
> The present thesis has, in the same or in similar form, never been handed in to another board of examination.

_____   _____

Date   Signature

4.2.10 LENGTH OF THE THESIS

The length of the thesis varies according to the chosen topic, but **must exceed a minimum of 30 pages but should not exceed 40 pages** including the table of references and footnotes but excluding all other lists and appendixes. Further details concerning the thesis will be discussed with the thesis supervisor.

4.3 SUBMISSION

The thesis has to be submitted as an electronic copy (PDF-file) via www.turnitin.com. The page margins should be 3.5 cm on top and bottom and 2.5 cm on both sides. The thesis has to be written on a PC with font size 12 and line spacing of 1.5. Footnotes have to be formatted in font size 10 single-spaced and with 1.5-line spacing between two footnotes. All these settings and additional ones for headlines can be found in the style sheet for bachelor theses provided by the supervisor. If necessary, alternative media like software or video/ audio files may be submitted in addition to the written thesis.

5. IMPORTANT DATES

5.1 THESIS SEMINAR

Thesis Seminar Session	Time
Kick-off meeting	February 8, 2018 - 14:15 - 17:00h
Introduction to thesis writing skills	February 15, 2018 - 14:15 - 17:00h
Poster presentation of thesis proposal	March 13, 2018 - 09:45 - 12:30h
Poster presentation of final results	May 4, 2018 - 09:45 - 12:30h

5.2 DEADLINES

Requirement	Deadline
Thesis proposal	**March 19, 2018 (noon)**
First draft	**May 7, 2018 (noon)**
Final thesis	**May 17, 2018 (noon)**

6. GRADING

To successfully pass the requirements of the thesis project students must attend all meetings, must present their posters, and must submit all required documents (i.e. proposal, draft, and final thesis) by the relevant deadlines. If all of these requirements are fulfilled, the final grade for the thesis project will be the grade of the written thesis. Failures to attend any meeting, not presenting a poster, or submitting a document after the given deadline will result in a deduction of the **final grade by 0.33 each**. Late submissions will result in a fail of the thesis project if the original deadline is missed by 7 days or more.

In exceptional cases, students may ask for a deadline extension. In such cases, the student must contact the supervisor to approve a deadline extension specifying the new deadline. The supervisor decides whether the new deadline can be approved. It is the student's responsibility to contact the supervisor in due time (usually no later than 1 week before the original deadline) and to submit the written approval for deadline extension to the program coordinator **before the original deadline**.

The thesis will be graded by the thesis supervisor. The grading takes into account the quality of the student's research, the autonomy it is conducted with, and the time management of the thesis project. In detail the following aspects will be evaluated:

- **Problem Definition:** This criterion evaluates how good the research topic is presented and defined within the introduction of the thesis. It is evaluated how the practical and the theoretical relevance of the topic are argued and how the research aims are deduced and the methodology is reasoned.

- **Scientific Methods:** It is evaluated how well the author has used scientific methods like theories, approaches and methodology and applied them to her/ his topic. It is evaluated as well how good the reasoning for choosing certain scientific methods is.

- **Systematic Approach:** It is evaluated how good the design of the structure of the thesis is. Whether there is a clear train of thought within the order of the thesis or whether it is rather unstructured and not an appropriate study design.

- **Substantial Problem Solving:** The completeness of the tasks within the thesis is evaluated within this criterion. Another aspect is the reasoning within the thesis, whether it is argued how the statements within the thesis are found as well as the reasoning concerning the choices of used theoretical and methodological frameworks. Other aspects are the originality of the work, whether the author has made own contributions to theory and practice, and the traceability that it is understandable why and on which basis statements are made.
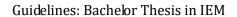
- **Literary Foundation:** The literary foundations evaluates whether international literature is used in the thesis. This is important to get an overview of the status quo of research and not just working of a single perspective of one researcher or one school. In addition it is important to have different types of literature (Journals, Monographs etc.) in the thesis in order to show that you have an overview what is state of the art.

- **Linguistic Presentation:** The criterion evaluates the linguistic aspects of the thesis. For example how precise the subjects and statements are expressed. A second aspect is the fulfillment of writing norms.

- **Citations:** It is evaluated how well the author has used citations within her or his thesis. Whether indirect and direct citations are used when it is necessary or useful.

- **Thesis Appearance**: It is evaluated how well the thesis is outlined. For example if the necessary appendixes and indexes are included and how the text and the figures look.

Thesis Evaluation Sheet

Name: _____   First Name: _____

Topic: _____

_____

_____

Grading Criteria	Weight	Extremely negative		Neutral neither/ nor			Extremely positive		points X Weight
		1	2	3	4	5	6	7	
1. Problem Definition Explicit description of the topic• Outline / delineation of the topic	3,0	☐	☐	☐	☐	☐	☐	☐	
2. Scientific Methods Clarification of scientific instruments• Usage / adoption of methods	3,0	☐	☐	☐	☐	☐	☐	☐	
3. Systematic Approach a) Structure (Design) (1,5) b) Train of thought (Central theme / conclusiveness) (1,5)	3,0	☐	☐	☐	☐	☐	☐	☐	
4. Substantial Problem Solving Completeness of tasks • Reasoning of statements • Traceability • Originality	5,0	☐	☐	☐	☐	☐	☐	☐	
5. Literary Foundation International literature • Journals • Monographs	2,0	☐	☐	☐	☐	☐	☐	☐	
6. Linguistic Presentation Conciseness of expression / style • Compliance to writing norms (grammar, punctuation, orthography)	2,0	☐	☐	☐	☐	☐	☐	☐	
7. Citations	1,0	☐	☐	☐	☐	☐	☐	☐	
8. Thesis Appearance Indices • Tables • Figures • Text • Evidence	1,0	☐	☐	☐	☐	☐	☐	☐	

Σ 20   Points [ ]

Points	20 - 59	60 - 66	67 - 73	74 - 80	81- 87	88 - 94	95 - 101	102 - 108	109 - 116	117 - 124	125 - 132	133 - 140
Grade	5,0	4,33	4,00	3,67	3,33	3,00	2,67	2,33	2,00	1,67	1,33	1,00

Strengths

+	
+	
+	
+	
+	

Weaknesses

-	
-	
-	
-	
-	

_____   _____   _____
Name of Evaluator   Date   Signature