

Wageningen University - Department of Social Sciences

# Operations Research and Logistics

## **MSc Thesis Protocol**

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## 1. Introduction

This protocol describes the rules and procedures for writing a thesis at the Operations Research and Logistics chair group, with an ORL-804\*\* code, based on the *MSc Thesis Protocol Social Sciences February 2011*.

The protocol applies in the first place to the major – the final thesis of the MSc programs – and will, with the exception of the admission requirements, also be used for minor theses.

The protocol includes information on the goal of the thesis, the role of the thesis agreement, the admission requirements, the responsibilities of the key actors, the assessment procedure, plagiarism and the submission requirements of the final thesis. The thesis agreement, and the thesis evaluation form can be found by a link on the ORL-website <http://www.wur.eu/ORL/> to the OWI website.

## 2. Research profile of the Operations Research and Logistics group

Decision making in Agribusiness and Food Supply Chains is complicated by specific characteristics related to the products, product sources and processes. These encompass perishability of goods, volume constraints, production of by-products, variability in quantity, quality and timing and in geographic sourcing areas associated with differing growth seasons in different areas of the world. As a result, innovative logistics management concepts and decision support models and tools are continually needed by all kinds of institutions to maintain or improve the robustness of their performance.

We have the following three main objectives:

- To identify, analyse and understand developments in the life sciences (with emphasis on sustainability, technology and quality management) that put new requirements on logistics concepts and decision support models in the specific domains;
- To contribute to developing innovative and sustainable logistics concepts and models given the continuous changes in the environment;
- To develop dedicated decision support models and tools that are able to deal with the specific characteristics and the increased complexity and uncertainty of the given domains, and enable the assessment and application of the newly developed concepts.

Our research can be summarised as *model-based design of logistics systems in agribusiness and food supply chains*. It has three research themes:

1. Quality Controlled Logistics (QCL)  
Topics: Inventory management of perishable products, production planning of perishable products, sourcing strategies for perishables, design of responsive fresh supply chain networks, reduction of postharvest losses in food supply chains.
2. Sustainable Food Supply Chain Management  
Topics: Waste recovery management, Closed loop supply chain management, Green logistics, Sustainability assessment and evaluation, Eco-efficiency, Pareto-Optimality, Multiple objective / multiple goal programming.
3. Efficient modelling and algorithms for Decision Support Models  
Topics: Simulation driven optimization, Constraint Programming, Dynamic Programming, Branch-and-bound, Mixed Integer Linear Programming.

## 3. Goal of the thesis

The overall goal of a social sciences thesis is the development of research skills and the ability to analyse and present research results in a systematic and clear way. The thesis is the culmination of the MSc study program in which the student will have to show that he/she is able to design and conduct social science research at an academic level and is able to theoretically reflect on a particular field of research relevant to the MSc program at hand.

The thesis process, in which a student independently\* addresses a topic approved by the chair group, is an individual learning process that can be started and finished at any time during the academic year. Upon completion of the MSc thesis, the master student will be capable of independently conducting social science research. Hence, the main responsibility for a successful thesis process rests with the student, who is expected to take an active role and to display growing independence and maturity, but has to consult regularly with the assigned supervisor regarding progress.

The writing of a thesis at ORL is a process during which the student is expected to become competent in:

- Carrying out the different phases of research in an independent\* manner within a previously agreed time span;
- Evaluating relevant concepts, models and algorithms and applying these concepts, models and algorithms to a relevant scientific problem;
- Applying a work ethic appropriate to the performance of scientific research, the development of scientific understanding and its application;
- Writing a well-structured thesis.

\* At the ORL group we provide additional guidance during parts of the thesis process, due to the complex nature of the work field.

## 4. The thesis process

The thesis process, and thus the acquisition of specific research skills, generally relates to proposal writing, data collection (literature research) and data analysis (modelling) and the writing of the thesis. In detail, the following aspects can be distinguished:

1. Topic or problem → Orientation
2. Research objective
3. Research question (+ sub-questions)
4. Research strategy (Methodology)
5. Data collection / Literature research
6. Data analysis / Model building and solving
7. Results / Model results and sensitivity analysis
8. Discussion and conclusions = implications regarding objective

Aspects 1 – 4 form the thesis proposal.

### Thesis Proposal

The thesis proposal contains the following aspects:

- Background: explain the area of the thesis, company, sector etc.
- Problem statement / Aim = Research objective / Research Question (+ sub-questions)
- Literature: describe 3-5 scientific papers that are related to the topic of your thesis
- Research Framework = Methodology: which methods to be used in your thesis e.g. desk research / interviews / data collection / model building
- Research material: which data is already available, which need to be collected
- Planning: tasks for each week of your thesis
- References

In total the proposal is about 10 pages.

### Research Objectives of an ORL-thesis

An ORL-thesis may be design-oriented or practice-oriented. Mostly, a design-oriented thesis is performed at the chair group, and a practice-oriented thesis is performed at a company. The objectives of both types of thesis are different.

- Design-oriented: the objective is to contribute to the development of decision support models and tools that are able to deal with the specific characteristics and

the increased complexity and uncertainty in practice. The goal of the thesis is a (mathematical) model and/or a solution approach.

- Practice-oriented: the objective is to contribute to analyzing and solving a problem in practice for a specific company. The goal of the thesis is solving the problem.

Typical practice research questions are:

- What is the current situation?
  - How is this process currently organised?
  - What are the results (performance)?
  - What are the problems, according to the different groups of stakeholders?
  - Is the process the same for different types of products/projects, and are the results the same?
- What is desired situation?
  - What does theory say:
    - about.....?
  - What do the internal stakeholders say:
    - about ...?
  - What could be learned from other firms?
  - Practitioner literature, benchmark firms..
- What intervention is required to get from the current situation to the desired situation?
  - ....

#### **Literature research / Model building and solving and the writing of the thesis**

- Literature research related to your problem;
- Formulating and testing a (mathematical) model or solution approach to solve the problem;
- The selection and review of additional literature as new insights emerge;
- The results of your model or solution approach applied to the considered problem and a sensitivity analysis;
- The writing of a well-structured and scientifically sound report, the thesis.

It has to be emphasized that in reality the research phases may not be so clear-cut.

The size of the major thesis varies between 30 and 39 credits. The actual size depends on the student's study program and is agreed upon before the start of the thesis.

#### **Thesis report**

In general, the thesis report starts with (an improved version of) the proposal, without the planning part. The next chapters answer the sub-research questions, mostly a chapter for every question, with in the second chapter the literature review as answer to the first sub-research question. In the Conclusion chapter the main research question is answered based on the answers on the sub-questions. In the Conclusion chapter no new information may appear. Finally, in the Discussion and Recommendations chapter you reflect on your research and give recommendations for the company and/or for further research. This format is not mandatory, you may have good reasons to choose another structure for your report. In Appendix I the mandatory format for the title page of your report is given. You are free in the design of the cover page of your report.

## **5. Supervision and thesis agreement**

The thesis process is to be supervised by a staff member of the ORL chair group. A supervisor from an external organization cannot have a formal role, and cannot be involved in the marking. If more supervisors and chair groups are involved each role should be explained under item 5 in the Thesis Agreement. WUR employees outside the university section (e.g. researchers) can be regarded as supervisor like a WU lecturer.

The ultimate responsibility for supervision and examination remains with the supervising chair group expressed in the three-letter code of the thesis. The thesis coordinator of the chair group is typically involved in the selection of the thesis supervisor.

The thesis agreement formalises the agreements made between the student and the thesis supervisor (expected date of completion, frequency of meetings, absences, co-supervision, etc.). In this sense, it is a supplement to and elaboration of the rights and obligations of the parties, based on the Higher Education and Research Act, the Education and Exam Regulations and the Student Charter. The establishment and signing of the agreement involves the student, the supervisor and the study adviser. Before a student can actually commence the thesis process and the thesis agreement can be prepared, the thesis coordinator has to check with the study adviser whether the student has permission to start thesis writing.

## 6. Prerequisites for admission to major thesis

With respect to the starting of the thesis, the Examining Board of the Social Sciences Group has decided that the individual student must satisfy the following requirements in order to obtain definite admission to the thesis (cf. article 4.5.3 of the Student Charter 2010/2011, p. 39):

- For MME and MAB students:  
Successful completion of two prerequisite courses: Decision Science 2 (ORL-30306) and Operations Research and Logistics (ORL-30806);
- For students of other master programmes:  
Successful completion of one prerequisite course: Decision Science 2 (ORL-30306) or Advanced Supply Chain Management (YSS-32806) or Operations Research and Logistics (ORL-30806);
- Successful completion of the research methodology courses and other supporting courses (if included in the individual study agreement and in agreement with the study adviser);
- Satisfactory overall study progress. The Examining Board has delegated the implementation of the admission procedures to the study advisers.

## 7. Responsibilities of key actors

The MSc thesis project involves several key actors. The distribution of responsibilities in this process is as follows:

**Student's responsibilities:** The student is owner of his/her own thesis project and thus responsible for its successful completion. These responsibilities include proper planning of the thesis within his/her study program, and (finding and) making a choice for a thesis topic in consultation with the thesis coordinator. The student is responsible for making a timely appointment with the thesis coordinator: three months before the desired start of the thesis. The student is also responsible for the establishment of the thesis agreement in which, amongst others, agreements regarding the intensity and nature of supervision are specified. It is the student's responsibility to inform the supervisor and the study adviser of deviations from the agreement and of any delays in the thesis process, and for determining the consequences of any such delay (informing the sponsor of the scholarship, the student, dean, etc.). The student must submit two clean hard-copies of the final thesis to the supervisor, and a cd/dvd with the final thesis in MS Word and pdf, and all model- and data-files. The student is responsible for filling in the electronic evaluation course form that will be sent to him/her after the thesis is finalised and the mark is given.

At the end of the project you have to write an abstract of max. 200 words about your completed project on the title page of your thesis. The abstract has to be checked by your supervisor and send to [Karin.Pauls@wur.nl](mailto:Karin.Pauls@wur.nl). This information will be put on our

website <http://www.wur.eu/ORL> as example project to inform other students. The abstract will be used anonymously and should not contain confidential results.

**Thesis supervisor's responsibilities:** The thesis supervisor from the ORL group is responsible for providing adequate supervision of the thesis for a student assigned to him or her. In addition, another supervisor either from within the university or outside it may be involved in the supervision, but the responsibility for primary supervision rests with the main supervisor from the ORL group. The supervisor provides one copy of the final thesis *and* the completed final assessment form to the chair's thesis coordinator for filing purposes, in view of, amongst other things, the visitation and accreditation processes.

**Examiner's responsibilities.** An examination involves at least two persons, the head of the chair group or a staff member and the supervisor. A PhD student cannot be a formal examiner. At ORL an examiner (second supervisor) is involved in the approval of the thesis proposal and is responsible for the final assessment of the thesis together with the thesis supervisor.

**The chair group's responsibilities.** Since October 2009 all master theses have to be uploaded to the Wageningen UR Digital Library through the AIR (Administration Enrolment data and Results). It is up to the involved chair group and student to decide whether the thesis will be made public or not in the Digital Library. It is the chair group's responsibility to upload the thesis. The chair group can adjust the weight (percentages) of the assessment criteria, within the indicated ranges on the Excel-form. The student should be informed on this (item 9 of this agreement).

## 8. Presentations of the thesis proposal and the final thesis

The student has to perform two oral presentations during the MSc thesis process. First the presentation of the thesis proposal, and towards the finalisation of the thesis, the student has to present about the entire thesis project. Every month, the ORL group organises a colloquium for these presentations. Students are expected to attend also the presentations of other students.

To sign-up for the ORL Student Presentations, please send the following information to [Karin.Pauls@wur.nl](mailto:Karin.Pauls@wur.nl) (e-mails with incomplete information will not be considered):

- The name of your supervisor;
- Type of presentation: in this case: internship;
- Company / organisation you are working for;
- The title of your presentation (this will not be changed afterwards on the website).

For the presentations we have set the following time limits:

- Presentation of MSc proposal: pitch presentation max 5 minutes, discussion max 5 minutes;
- Final presentation of MSc thesis: presentation max 15 minutes, discussion max 5 minutes;

Please read the ORL Student Presentation Guidelines on the ORL website.

## 9. Submission requirements and procedures

Before the thesis defense and final assessment, the student gets the opportunity to submit a concept thesis that will be discussed in a meeting with the student, the supervisor and the examiner. The (digital) concept thesis has to be available one week before the concept discussion. If the student may use the copies with review comments of the supervisors to improve the thesis, these copies **must** be returned together with the final thesis hard-copies.

A hard-copy of the thesis must be available for each person who takes part in the final examination. The copies, if applicable together with the concept copies, must be submitted to these persons at least one week before the date of the final assessment (defense). The student needs to submit two clean hard-copies of the final thesis and a cd/dvd with the final thesis in MS Word and pdf, and all model- and datafiles. The supervisor has to make sure that the ORL secretary receives one clean copy of every final thesis for filing purposes. The ORL secretary is responsible for filing both the theses and the theses evaluation forms for further use. The expenses for printing and copying of a maximum of three copies of the thesis can be submitted for reimbursement to the chair group (see also article 8.4.2, page 64 of the Student Charter 2010 /2011). If the student decides to spend more than is absolutely necessary, for example to improve the appearance of the report, the student pays these additional expenses.

The thesis is public and can be used by third parties. A study can be carried out for a commissioner and the results may be undisclosed and treated as confidential for a maximum period of 5 years. However a review committee must have access even to the confidential reports. This has to be specified in a special agreement. Even if data have to be treated confidentially, the oral presentation remains mandatory. In the case of a confidential study the oral presentation can be given at the company's place (in presence of the supervisor(s)).

Since October 2009 all master theses have to be uploaded to the Wageningen UR Digital Library through the AIR (Administration Enrolment data and Results). It is up to the involved chair group and student to decide whether the thesis will be made public or not in the Digital Library.

No standard index for the thesis is available since the index depends on the character of the research done. Appendix I contains the standard format for the cover page of the thesis.

## 10. Assessment procedure

### Grading

The head of the ORL group (prof. dr. ir. J.G.A.J. van der Vorst) is responsible for the examination of the thesis and is expected to conduct its final assessment together with the supervisor. In general this task is delegated to another staff member. In the case of co-supervision (i.e. from outside ORL), all supervisors should be present at the final evaluation. When the head is the supervisor, an independent examiner has to be nominated.

The final assessment, or defence, typically lasts one hour to discuss the quality of the thesis. The student is given the opportunity to answer specific questions raised by the examiner or supervisor(s) in order to show to what extent he/she masters the research topic and to what extent he/she is able to participate in academic debate.

The supervisor(s) and the examiner jointly agree on the final mark using the criteria specified below and by filling in the evaluation form. If no agreement is reached, the head casts the last vote. Appeal procedures exist via the Examination Board for all involved.

### Assessment criteria

In order to make the assessment procedure as transparent and as objective as possible, an evaluation form will be used for grading. The form can be found by a link on the ORL-website <http://www.wur.eu/ORL/> to the OWI-website and is used for every thesis at Wageningen University. The form consists of two major and two minor clusters and each cluster contains a number of aspects that should be taken into account. This evaluation form that is used throughout the university also serves as a quality maintenance device to be used for external evaluation and accreditation purposes.

The general orientation of the clusters on the thesis evaluation form is as follows:

*1. Research competence:* This part assesses the research competences of the student. So it is an evaluation of the student as a researcher. This evaluation is based on the



experience of the supervisor(s) with the student during the process of doing research and writing the thesis report. The learning process and the degree of manifested professionalism as a prospective independent researcher will be taken into consideration, just as the attitude of the student in terms of enthusiasm, commitment, effort and initiative, independency, originality and creativity. At ORL this part is 45% of the final grade.

*II. The thesis report:* The product of the scientific work of the student is the thesis report. This is a piece of scientific work that can be evaluated in the same way as any other written scientific work (like a journal article or a report). Based on the classical contents of a scientific report (Introduction – Materials and Methods – Results – Discussion – Conclusions) the aspects in this cluster assess the level of these different parts of the report. It is important that the person who evaluates the thesis report is not biased by positive or negative experiences with the student as the thesis report should be evaluated as a piece of work as such. This means that the examiner is the most important person to evaluate the thesis report. At ORL this part is 45% of the final grade.

*III. Colloquium:* During the colloquium the student presents the work to an audience consisting of fellow students and staff members. Both the quality of the slides (graphical presentation) and the verbal presentation and defence, based on critical questions from the audience, are evaluated. At ORL this part is 5% of the final grade.

*IV. Examination:* During the examination the student has to defend the thesis against critical comments of the examiner and the supervisor(s). In defending the thesis, the student should show that he/she has knowledge of the study domain. This means that the student should not only defend what he/she did, but also why it was done in this particular way and not in another way. At ORL this part is 5% of the final grade.

### **Final assessment and special considerations**

For the final assessment, the following restrictions exist:

- For a final pass (=6) the minimum score of the first two clusters (Research competence and Thesis report) should be 5.5.
- Only one 5 is acceptable for the other two clusters (Colloquium and Examination).
- None of the clusters should be less than 5.

## **11. Plagiarism**

The fact that all research is directly or indirectly based on the intellectual work of others, on their theories, their models or research findings, makes scientific writing a risky process, especially in an era in which 'cut and paste' possibilities are overwhelming. Plagiarism, or using the work of someone else without acknowledging it, is considered theft of intellectual property. A charge of plagiarism can have severe consequences. Wageningen University heavily insists on documenting sources. In order to avoid plagiarism, staff is expected to screen all writings carefully and the University has made software available for this purpose. "If a lecturer or Examiner ascertains plagiarism, he immediately informs the Examining Board as well as the student(s) involved. After providing a hearing to the student(s) involved, the Examining Board decides if fraud has actually occurred and can punish the student(s) involved by preventing them from taking the interim examination(s) or submitting the paper(s) or project(s) for up to one year." (Source: WU Student Charter 2010/2011, section 5.3.3, pp 46 Students are expected to be familiar with proper referencing techniques and to have consulted one of these sites before they start writing the thesis:

<http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml>

<http://www.lib.monash.edu.au/tutorials/citing>

An interesting book on referencing techniques is suggested by Reena Bakker- Dhaliwal who is the lecture of the MOS-module Scientific Writing (ECS 65600): Pears, Richard and Shields, Graham. *Cite Them Right: the essential referencing guide*. Durham, England: Pear Tree Books, 2009.

Appendix I Format for the MSc-thesis title page

Wageningen University - Department of Social Sciences

# Operations Research and Logistics

BSc/MSc Thesis/Internship

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## Title

### Subtitle

#### **Abstract**

Write here your abstract of max. 200 words. The abstract should be suitable for use on our website to inform other students. Send the abstract after approval by your supervisor to [Karin.Pauls@wur.nl](mailto:Karin.Pauls@wur.nl).

Note that this format has to be used for the title page, you may want to design your own cover page. Do not put the abstract on the cover page.

Month, Year

<b>Student</b>	Name
<b>Registration number</b>	Number
<b>MSc program</b>	Master...(or BSc)
<b>Specialisation</b>	If applicable
<b>Commissioner</b>	Company name or research project
<b>Supervisor(s)</b>	Name (WU) Name (Company)
<b>Examiner/2<sup>nd</sup> supervisor</b>	Name
<b>Thesis code</b>	***_****



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