

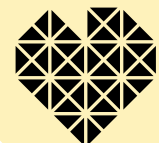


Navigating doctoral studies in Operations Management and Industrial Engineering

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Abstract

This short guidebook aims to address some frequently asked questions about doctoral studies in industrial management/industrial engineering and the related subjects.

The purpose of this guide is to provide practical information with some background justification for each of the items. This is not a replacement for any university official instructions, degree structures or courses offered by the university.

The contents of the guide consist of following: positioning what is our field of study, writing and defending a research plan, conducting a literature review and founding on theoretical framework, addressing questions related to research methods, discussing academic publications in conferences and journals, and outlining what constitutes a dissertation in a doctoral level.

We hope that this book will demystify the process of doctoral studies, give practical advice of selecting the right journals, conferences, helping to handle review feedback, and other essential parts of the doctoral studies.

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1 INTRODUCTION

This guide aims to answer some frequently asked questions about doctoral studies in industrial management. The text is based on approaches and methods conducted at various doctoral seminars and discussions from the past years. Each doctoral study varies, and there may be no identical routes, but there are still many common elements that one needs to learn. This is why we call this book as a navigation guide.

Darth Vader, "The force is with you, young Skywalker, but you are not a Jedi yet."

1.1 What are operations management and industrial engineering?

When applying the right to study in a doctoral degree programme, whether coming from an engineering background in industrial engineering or a business background in operations management, students are expected to have relevant knowledge, or to have at least an understanding of what the area actually contains. Preferably, the students should already have a previous degree in the subject, but this has not always been a strict requirement.

Our field of business, *tuotantotalous* in Finnish, is somewhat cross-disciplinary combining approaches from technical studies, business, and management. In Finland, it is often translated as Industrial Engineering and Management as it is a subject taught at Schools of Engineering but having still an important management focus. Historically, the concept is related to the Swedish concept of *produktionsekonomi* (production economics), which emphasises the application of mathematical and statistical approaches to industrial problems and while also considering business-related indicators (economics). In that sense, it has close links to management accounting, operations research, and quantitative tools in management science.

The topic relates to several subject areas, which will become evident when finding relevant journals specific to your doctoral work and thesis topic. A common characteristic of all these disciplines is their practical and applied nature. The objective of a study is typically to build further understanding or propose new methods to improve some industrial context or application. This can involve several metrics or measurable key performance indicators, both technical and financial, as well as socio-environmental considerations. Concepts such as productivity, efficiency, effectiveness, profitability, or payback are often

included to combine the technical views with business and management related attributes of the problem.

- Operations management is typically taught at business schools, focusing on the business side and analytical tools related to management science and operations research. Operations management goes hand in hand with information systems (sometimes management information systems) in degree programmes.
- Industrial engineering is a related subject but is positioned in engineering schools. The related subjects are production engineering and mechanical engineering, and sometimes applied mathematics. Since improving industrial processes isn't limited to manufacturing alone, today, industrial engineering also covers a broad range of topics, including technology management, engineering management, and various other types of operations, including services.

In Vaasa, candidates have the opportunity to pursue doctoral degrees in business administration and engineering under the umbrella of Industrial Management. It is an old but useful concept to cover the wide spectrum of methods and approaches in the field. Hence, the candidates can graduate with either a D.Sc. in Technology or a PhD (business administration).

1.2 What it takes to complete a doctoral degree?

Doctoral programmes are very different compared to master's degrees. The work is much more independent, based on research work and much less based on any taught courses. Studying requires working independently, even when there is a good department team, laboratory fellows, or project co-workers. A lot of writing (and rewriting) will be taking place, so that should be a skill you will enjoy.

Writing the thesis is the primary focus of the degree. Research plans, literature reviews, methodological discussions, results of analyses and conclusions will all become part of the written book – the thesis. The book should demonstrate the ability to conduct independent research and novelty. In other words, the work must be done by the author from design to actual execution and should present a new result or approach to the problem.

The work also takes time and resources. Perhaps the effort is something between 5000 to 8000 hours. Funding may be available in projects and scholarships, but unfortunately, having the ability to focus four or five years on a doctoral study fully without working on projects is a rare exception.

All PhD candidates in industrial management have similar requirements and aims, but the process of studying might vary at some level. Some candidates are employed by the university, and others are not. Non-employed (i.e., part-time students) candidates typically work in other organisations but conduct their research under the supervision of one or more Industrial management researchers. It is also common that contractual arrangements change over the course of the PhD journey. Nevertheless, the academic requirements for both categories of PhD candidates are identical.

Part-time students working in the industry need to find time outside working hours to work on the thesis and take some time off from work to complete intensive phases. Full-time studies may include periods of scholarships, but very often, project work is needed for funding reasons. The project topics are based on funding bodies' preferences, research group focus areas, university strategies and many other things completely outside a single doctoral thesis.

Hence, we can conclude that it is a lot of work, and the outcome is something comparable to a driver's licence. It is also important to note what doctoral studies are not. Completing doctoral studies is not some form of official recognition of a lifetime work in industry or educational merits. Doctoral studies should be aimed if one is targeting to continue toward research and development work in the future. Albeit the official title for persons pursuing a doctoral degree, according to the university system, being a doctoral researcher, -even if it might be sound at first hearing – it is not a paid job at the university. It means that one

is enrolled in the programme for doctoral studies. One is eligible for grant applications, but there is no guarantee of funding.

1.3 Career impact expectations

A doctoral degree is the highest academic degree, but at the same time, it is basically a driver's licence for independent research work. It is a requirement for academic positions, but by no means it is any endpoint. The competition for research grants, tenure track positions and teaching positions is fierce. A doctoral degree is not a guarantee for any academic position. As a matter of fact, only a small fraction of graduates of doctoral programmes will be tenured. In order to apply for entry-level tenure track positions, typically, the requirement is to have already a good number of publications, some from the thesis and some already in the pipeline as a postdoc – the life after the thesis.

It is a smart question to ask yourself – why do I want to obtain a doctoral degree? Many graduated doctors will be working in the industry, often with demanding development projects related to innovation, operations, and technology, where an analytical approach and capability to conduct long-term projects are desirable. The positions typically take place in technology management, research and development, innovation, operations excellence, and operations development.

Consulting is another typical career path for doctors in industrial management. The sought-after skill is the ability to swiftly handle substantial volumes of information, analyse data, and draw analytical results, conclusions, and insights. Consulting can take place in large management or technology consulting companies or sometimes as independent contractors.

Teaching positions at universities and universities of applied sciences require a doctoral degree and pedagogic studies. These positions have very often responsibilities working with operations development and technology development. This is also a very common path for many graduates.

We can conclude that having a doctoral degree proves that the person is capable of long-term projects and has analytical skills to process results which can be generalised. This can enable several possible career paths, but not necessarily in academia.

2 PHASES OF STUDIES – STAGES AND GATES

The duration for a doctoral degree studies is four years full time or perhaps a couple more years when working outside the university or in case the working time is not fully allocated to doctoral studies. In many cases, the planned time is exceeded as unexpected challenges may arise during a relatively long period. There are often dependencies which cannot be controlled by the student. Access to empirical data may take longer, and some parts, such as statistical modelling, may need to be done several times. Moreover, processing times for journals may take time and not all the papers are accepted by the first outlet. However, it is good to have a process chart or schedule for the main activities, expected deliverables and milestones of the project. The schedule should be in line with the planned duration.

Figure 1 below illustrates an example of the Cooper style Stage-Gate model for doctoral research for some research and development work done inside a large company. Stages refer to activity phases during the project, and gates are the checkpoints where go/no go decisions are made before moving to the next step. These gates should be in a typical order in this illustration. The actual throughput time varies.

In reality, the process is not linear like in a textbook. The process itself includes reworking, reviewing and polishing. Especially when a thesis is based on articles, empirical collection, data analysis, and review can be linked to a specific paper. During the thesis process, these steps are iterative and take place several times.

In this proposed schedule the first conference presentation comes very early. It might be challenging if empirical material has not been collected or data analysis has not been done yet. However, it is recommended that you start building networks early and start getting external feedback. Literature reviews and positioning important research problems can be done with smaller empirical data. Prototyping the full concept in smaller pieces can help improving the research design and extending the actual full scale data collection will be easier when some piloting has been done and review feedback has been received for the smaller study. You can find an example for an article-based dissertation timeline and major events in the table below (Table 1.)

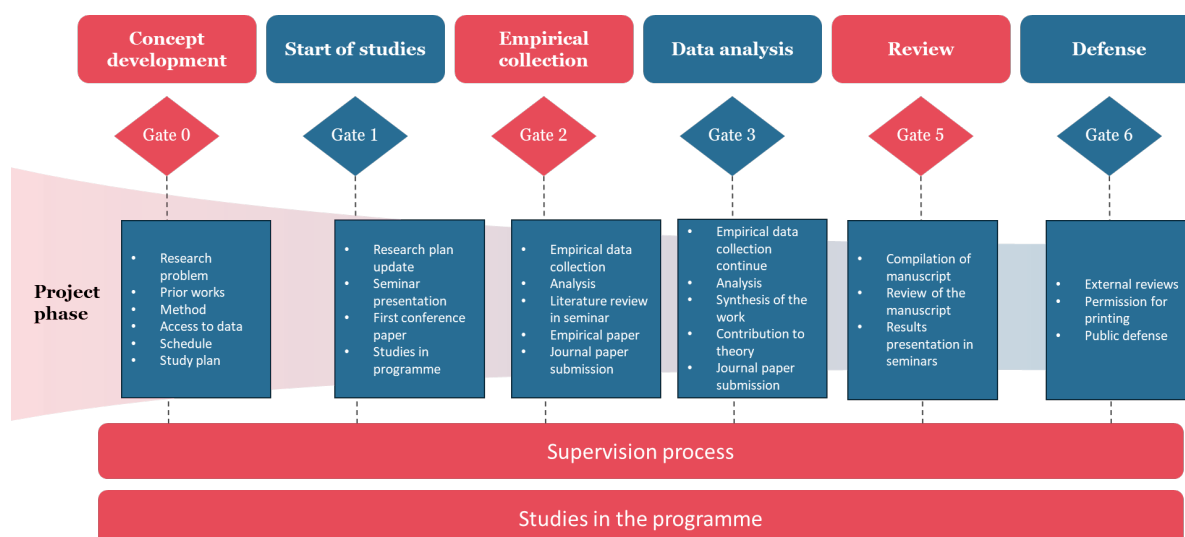


Figure 1. Important milestones in the doctoral studies – a gate-model (example).

Table 1. Timeline and major events (an example for an article-based dissertation).

Project phase	relation to gate(s)	Schedule	Explanation / Recommendations
Drafting the research gap, idea and plan & conceptual development. Submission of PhD studies application.	0	1/2023 – 3/2023	Before applying to doctoral studies
Evaluation of the application	0	4/2023 – 6/2023	
Research plan update and seminar presentation	1	9/2023 – 11/2023	
Coursework	1 & 2	9/2023 – 9/2025	It is recommended to take the course work in the early phases of the process. Particularly method courses should be taken preferably before the data collection and analysis starts.
Literature review	2	9/2023 – 3/2024	Literature review is a task that takes place multiple times during the process. Can be related to research plan, articles and the introduction of the thesis
Literature review in the doctoral seminar	2	5/2024	
Empirical data collection	2 & 3	3/2024-5/2025	Empirical data collection task can take place multiple times during the process. It is recommended to collect data for multiple papers once. But sometimes it happens that

Project phase	relation to gate(s)	Schedule	Explanation / Recommendations
			the candidate collects data for all papers separately.
Analysis of the data	2 & 3	5/2024-6/2026	
Conference papers and presentations	2 & 3	7/2024-12/2026	You can name potential conference to the schedule.
Paper submissions to journals	2 & 3	9/2024-12/2026	You can name potential journals here.
Writing the introductory chapter	4	11/2026-5/2027	
Submission to pre-examination	4	5/2027	The given pre-examination time is two months but sometimes it takes a bit longer.
Results presentation in the doctoral seminar	4		
Pre-examination	5	5/2027 – 8/2027	
Public defence	5	10/2027	

Doctoral studies include also a set of course. In Finland, and perhaps in Europe generally, the number of courses required is not very high as all applicants are required to have a M.Sc. degree already. There is a lot of flexibility on actual courses, and in many cases a lot of emphasis is given for conducting steps supporting the thesis work. The studies in major subject should support the themes of the research. Similarity, methodological studies should be aligned to the methods one is expected to use in the thesis. There are doctoral studies available for quantitative methods, qualitative methods and sometimes on special topics. Publications which will not be included in the thesis, will be also available for credit points. Attending international summer schools may also present a good opportunity to present the research work and to get feedback from peers in a friendly environment. Outlining personal study plan should be done together with supervisor and aligned with thesis objectives.

3 RESEARCH PLAN

3.1 Purpose

A research plan is an important document for selling the research and managing the process. A research plan is typically a five-to-ten-page document with references. The documentation is sometimes combined with a presentation deck outlining the plan for the doctoral studies. The research plan aims to describe the problem, justify the importance of the topic, demonstrate some knowledge of the past works done in the field and then describe the actual plan for answering this research problem. Such a plan is needed to get accepted into the doctoral program and justify it in the research seminars. At the same time, the document should also have the planning component and a rough plan of what methods you plan to use and how you will collect your data. While these aspects can be planned in detail later, having a tangible idea of how to approach a certain problem gives a good impression of the plan. Plans can change, so one can modify the research plan along the way. Being afraid of fixing things too early may result in a loosely written plan that does not tell too much about the planned steps at all.

Citing prior works is an important part of the research plan. It shows that the applicant has read some earlier works and can show how the planned work is continuing the work done by others. Finding someone justifying your research area is also useful. Using references in the plan connects the planned work to the domain of operations management or industrial engineering. Without citations, the reader would wonder if there is any connection to the subject.

Very often, the methodological plan remains open in the initial versions of the plan. Sometimes vague expressions are used, such as "various quantitative and qualitative methods," which does not give a good impression to the person reading the plan. Reading published doctoral studies and journal papers may give ideas about how others have approached similar problems. Making the plan in a similar way might be a good idea. At the same time, it is a good opportunity to think about how to access the empirical data.

3.2 Contents

Given the ambivalent objectives of the research plan, it is difficult to give an example of a perfect document. The document will be updated a few times during the studies, and it will be developing. However, we can state that a research plan document should have the following points at least:

- Title page with project title and the name and contact information of the student.

- Research problem statement (the first idea of the problem)
- Introduction of the problem domain and objective of the study
- Purpose of the study
 - Try to be as clear as possible when writing a simple problem statement.
 - Anticipated limitation of your research: remember to write, e.g., the research fields you will use in your research.
- Academic reasoning for the research
 - It means research gap analysis, which is why this research is needed based on a literature review and using citations to relevant references.
- Research questions
 - Research questions (main questions and maybe also some sub-questions): check that the questions are linked to the research problem statement.
- Hypotheses / Propositions
 - Consideration of expected results or statement of propositions or hypotheses
 - Note that hypotheses are not used with qualitative methods. However, you can elaborate on the expected results on a higher level.
- Planned research method
 - Selection of research method, why this method
 - Data analysis methods
- Anticipated benefits of the research for the industry, in other words, practical reasoning for the research (practical impact)
 - Possible managerial implications
 - Expected impact on companies, society, etc.
- Elements in the theoretical framework
 - Contributions to theory, brief research gap analysis in current literature

- Citations to earlier key work in the problem domain
- Schedule
 - Key milestones: journal paper by topics, conferences, seminar presentation
 - Full-time periods of studying and part-time periods

Presenting a research plan is expected to give a good overview of the research problem you are working with. You need to defend your plan and justify its importance. A good research plan clearly explains what you aim to do, what methods you are using, where you get the data, and how you process your data.

3.3 Evaluation and checklist

The plan will be evaluated by several people, the admission committee, peers – fellow doctoral students in seminars, funding decision-makers, etc. There might be different criteria presented by each stakeholder and various weightings. Table 2 below shows an example of parameters used in evaluation at the University of Vaasa Industrial Management seminars. It acts as a good checklist for your presentation as well.

Table 2. Research problem statement evaluation.

ID	Item	Evaluation
RP1	Research problem statement <ul style="list-style-type: none"> - Introduction of the problem domain and objective of the study - Purpose of the study - Clarity of problem statement and avoiding various interpretations of the problem statement - De-limitation - Narrowing the scope of the study clearly 	0...5
RP2	Research questions <ul style="list-style-type: none"> - Clarity of research questions - Link from research questions to research problem statement 	0...5
RP3	Hypotheses / Propositions <ul style="list-style-type: none"> - Consideration of expected results or statement of propositions or hypotheses 	0...5
RP4	Academic reasoning for the research (academic impact) <ul style="list-style-type: none"> - Justification of research problem from academic literature (citations) 	0...5
RP5	Practical reasoning for the research (practical impact)	0...5

ID	Item	Evaluation
	<ul style="list-style-type: none"> - Possible managerial implications - Expected impact on companies, society, etc 	
RP6	Elements in the theoretical framework <ul style="list-style-type: none"> - Contributions to theory, possible gaps in existing work - Citations to earlier key work in the problem domain 	0...5
RP7	Completeness of research methodology <ul style="list-style-type: none"> - Completeness of data collection method plan - Data analysis methods - Justification of research approach - analysis of potential research methods 	0...5
RP8	Presentation of results <ul style="list-style-type: none"> - Quality and clarity of written report 	0...5
	Other comments or remarks	

Marks: 0 – Not considered at all, 1 - limited consideration, 5 – excellent consideration

The research plan document is a living document. It is natural that things become clearer as you progress through your PhD journey. You can deviate from the research plan if needed, in content wise and you may need to deviate from the research plan, both in terms of content and timeline, which is entirely normal. Or you can follow the plan loosely if it works well. However, it's important to remember that if what's written in the research plan isn't working, you can and should make adjustments. Don't fall in love with your written text and forget about the sunk costs which you unarguably have i.e., you have already put in so much effort and expected things to work eventually but you noticed that revisiting the plan is must. Supervisors should remind the student as well in this kind of situation.

4 LITERATURE REVIEW

4.1 Purpose

The purpose of a literature review is to demonstrate that you know the academic literature of your work. It means the theoretical frameworks you are applying and the prior works in the field. You should be able to synthesise from the literature of doctoral work - possibly develop hypotheses or a framework you test. A literature review is a task initiated when outlining the first version of the research plan and then continued during the studies, typically presented also in a research seminar, updated during the studies when one stumbles upon new papers and finally published in the thesis work. Literature study links the work to theoretical frameworks and demonstrates the knowledge of the ongoing academic works.

Conducting a literature review can be approached in two ways: as a systematic literature review or as a more relaxed approach. A good starting point is to perform a search using Google Scholar or Scopus with selected keywords to quickly gain an understanding of the research landscape. It's advisable to focus on recent works published within the past five years and those with the highest number of citations. Older papers often have more citations, as it takes time for others to reference a paper.

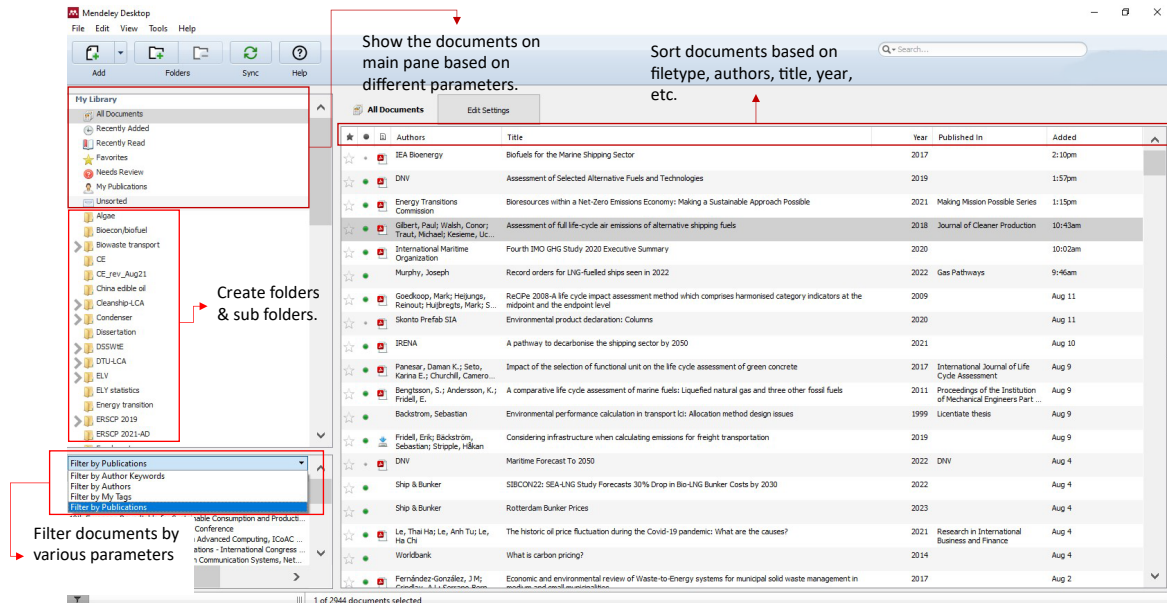
By reading the papers and what they cite, one can quickly figure out the theoretical frameworks typically used in the study's domain and what key papers others have cited frequently. After reading some 30 to 100 papers, one starts to build an understanding of the field and its connections. It helps to figure out what is relevant in the domain - Who are the key authors in the field? What type of research methods have been used? What are the journals publishing work related to the area? Sometimes, there are published literature reviews, which might be a good starting point to understand the key concepts in the fields. It could speed up the process significantly.

4.2 Organising references

Using reference management software such as Zotero, Mendeley, or EndNote to store relevant articles is a good idea for further use. These software packages allow integration into word processing as well as the generation of citations and references based on certain journals' styles. One can easily keep an up-to-date database of relevant publications after reading papers or when identifying papers for a reading list.

Zotero web plug-in (Chrome browsers) has a good feature, forwarding all journal links through the university library proxy site. It makes full-text access to papers transparent

and without any extra login steps. Compared to Mendeley, Zotero has more robust meta-data recognition of imported papers. It means that you have fewer manual work needs in working with references. Cloud-based group libraries might be useful when you collaborate with several authors. Figure 2 and Figure 3 are examples of what the interface of reference management looks like.



The software can import documents and its pdf (if applicable from browser by using add-on, it can connect to Ms. Words using Word plug-in for automatic citation, and citation style can be selected based on targeted journal.

Figure 2. Mendeley desktop interface.

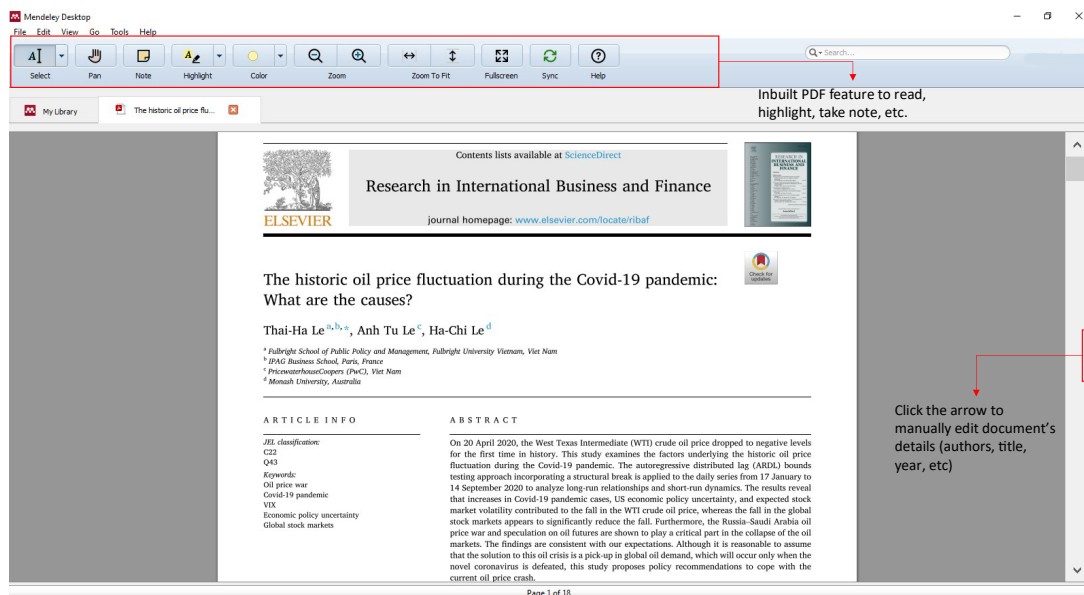


Figure 3. Inbuilt PDF function in Mendeley.

4.3 Systematic approach and tools

In a systematic literature review approach, the same process is built in a way where the process is recorded and can be replicated afterwards by others. Typically, this consists of several stages:

1. Outlining the objectives for the literature review – what are you looking for? What is the scope of the study?
2. Outline the protocol – What are the relevant keywords that should be used? What is the time range of papers? What databases are included in the search? What tools are going to be used?
3. Complete the search and export the results for the software.
4. Extract the data and process by using analysis software.
5. Analysing the results and building conclusions.

Today, several good online tools are available for the parts of the process, making it less tedious. Databases such as Google Scholar, Scopus, and ScienceDirect are useful for accessing papers with powerful searches, and the results can be exported to analysis software packages. Google Scholar has probably the broadest access to journals, conferences, and patent documents; however, to do a deep dive into the papers for reading and exporting results, it is better to go directly to publisher-related databases. Scopus provides a good overview of many relevant journals in operations management and industrial engineering, as shown in Figure 4, where the search uses multiple keywords.

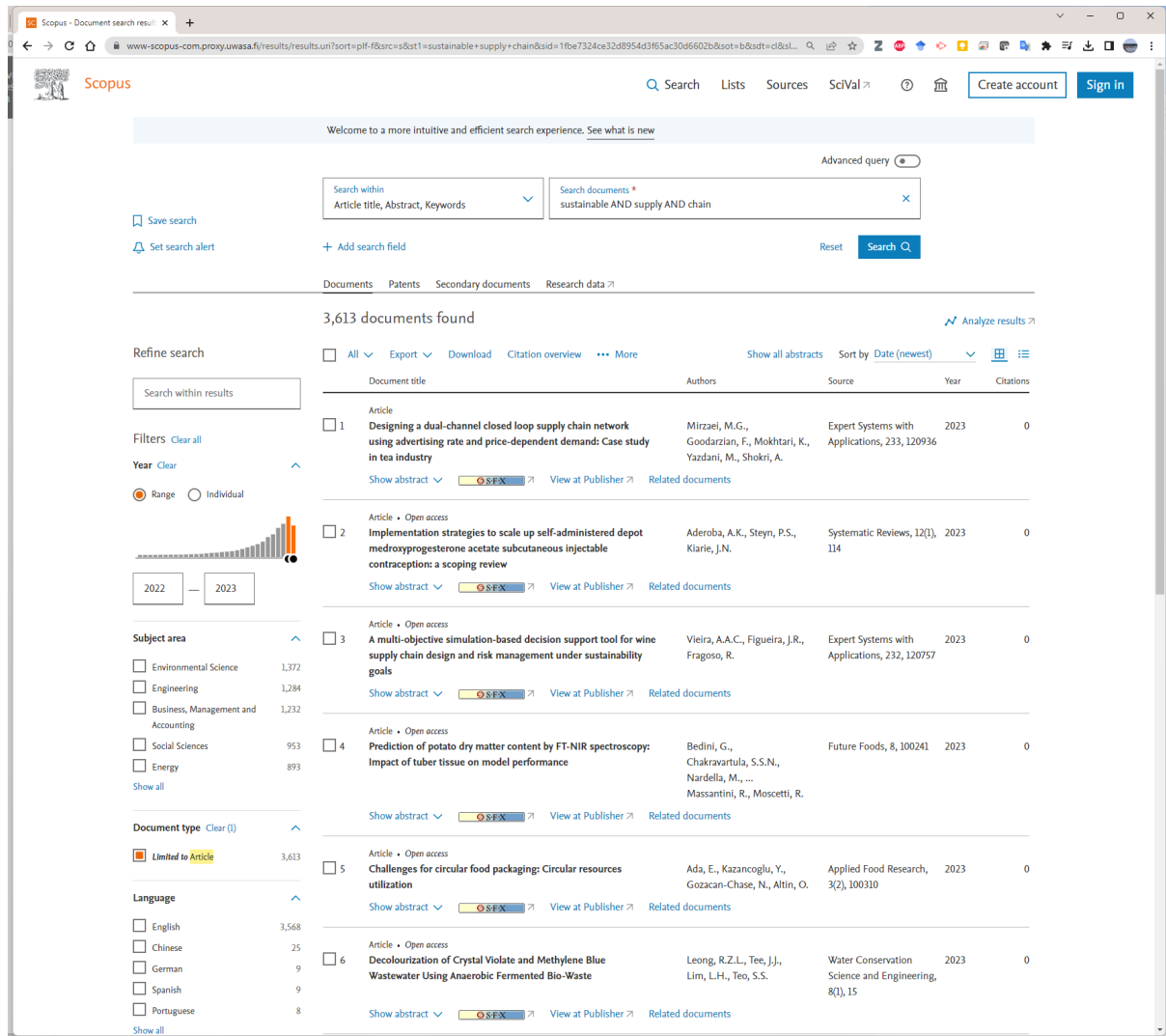


Figure 4. Scopus search result screen on "sustainability" AND "supply" AND "chain" keywords between 2022 and 2023.

A separate software is needed for a more systematic and comprehensive literature analysis. VOSviewer is a free software for building bibliometric analysis. It can use exports from databases and reference management software packages. VOSviewer can build network visualisations (see Figure 5). For example, key authors in the field can be shown in a way how they are citing each other. Another useful tool is to create concept mapping based on words in the title of the papers and the keywords used and outline a network map of the concept. Recent systematic literature review papers use this type of approach very often. Other potentially useful tools worth mentioning are Atlas.ti and Nvivo for qualitative analysis, word cloud tools and Connected Papers (connectedpapers.com) visual tool to find academic papers relevant to personal field of work.

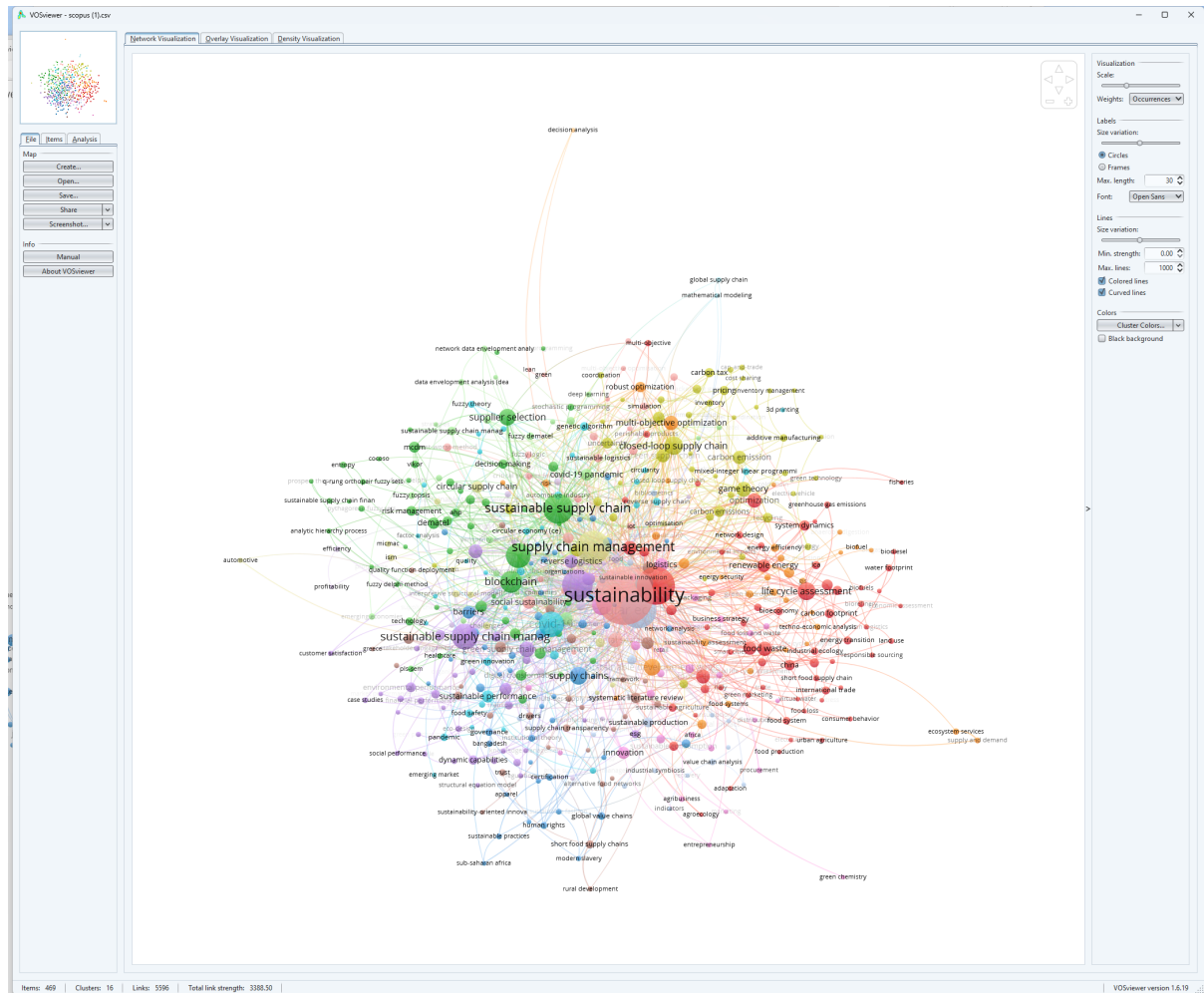


Figure 5. Figure 5 VOS Viewer on "sustainability and supply chain" export data from Scopus exported CSV file.

4.4 Structure

The structure of a literature review may vary a lot. Sometimes, it is an overview of the theoretical framework used in the study. With survey-related papers, it is very common to see hypotheses to be used in the study derived directly from the literature. In more technical subjects, the literature review may be closer to state-of-the-art analysis of certain technological implementations in research and industry. Nevertheless, the analysis should be focused on the research problem and not only on a general overview of some related theories. It should present the key aspects and come to an analysis or even synthesis of what this means for the study.

For journal articles and conference papers, a literature section is always required in each paper. This results a situation where in case of compilation dissertation, literature section is taking place as the second part of each paper and in addition also in the introductory part as well.

The list below is the checklist used at the Industrial Management research seminars at the University of Vaasa to present the literature review. Table 3 below is the evaluation form used by faculty and peers to assess the quality of the literature review. This form can also be used as a checklist when preparing the literature report.

1. Objectives of the literature review
 - Provide again a brief introduction of your updated research questions.
 - selection method of the literature domains (meaning which kind of fields your research touches and why you need these domains)
2. Scope
 - Previous literature in your research area
 - Theoretical framework (how you selected your theoretical framework)
3. Introduce the most important research done in your research area
 - Recent papers from the past 5 years in the domain
 - Identification of "classics" in the domain, the most cited old and new papers
 - Remember to refer to the research done in Finland and abroad, which journals and other sources are the best for you.
 - Describe also the literature research you have done so far and how you will continue in future.
4. Position your own PhD research with respect to the literature review

Table 3. Evaluation of Literature review at University of Vaasa, Industrial Management seminars.

ID	Item	Evaluation
LR1	Objectives of the literature review <ul style="list-style-type: none"> - Introduction to selection of the literature domains - Justification and reasoning for the chosen theoretical frameworks 	0...5
LR2	Scope <ul style="list-style-type: none"> - Previous work on the same research problem area - Theoretical frameworks to be covered 	0...5
LR3	Perspective <ul style="list-style-type: none"> - Justification of chosen perspective - Identification of forums publishing in the domain, research groups, individuals 	0...5
LR4	Coverage <ul style="list-style-type: none"> - Recent papers from past 5 years in the domain - Identification of "classics" in the domain, all time cited papers - In Finnish works, number of international journal papers - Critical voices 	0...5
LR5	Organisation <ul style="list-style-type: none"> - Clarity of writing - Use of tables, figures 	0...5
LR6	Process and methods used <ul style="list-style-type: none"> - Bibliometric methods 	0...5
LR7	Positioning own PhD research in respect to the literature review <ul style="list-style-type: none"> - Analysis of the literature - Synthesis of the literature review 	0...5
	Other comments or remarks	

Marks: 0 – Not considered at all, 1 - limited consideration, 5 – excellent consideration

5 RESEARCH METHODS

5.1 Research approaches

Operations management and industrial engineering are applied sciences that employ various research methods to solve problems, often of an applied nature. Research questions determine which methods could be used together with the availability of empirical data. Reading journal papers related to your own research is a good way to study how methods are applied. It gives confidence to plan the next stages of the project and think about publishing your work.

There are several approaches, and the tables below show some related readings Table 4 until Table 10. These illustrative examples can provide support for the following types of works:

- Operations management, in general
- Case study methods – single cases, multiple case studies, exploratory cases, action research
- Design science – engineering constructs, information system building, action research
- Survey – quantitative and qualitative descriptive studies with statistical analyses
- Computer simulation – discrete event simulation, system dynamics, Monte Carlo method, agent-based modelling (ABM)
- Decision support systems – mathematical optimisation methods, stochastic modelling, queue theory

The references are suggestions for readings related to each approach.

Table 4. Operations Management – relevant research method related readings.

Aspect	Topic	Reference
Positioning	What are the key theories in operations management?	Walker et al. (2015)
	Interdisciplinary nature of operations management	Holweg & Srai (2013)
Method types	What are the typical empirical research methods in OM	Flynn et al. (1990).
Results and impacts	How to contribute theory in OM?	Boer et al (2015)
Specific method questions	The challenge of being part of the organisation to research – action research specific matters	Ketokivi & McIntosh (2017)

Table 5. Case study approach – relevant readings.

Aspect	Topic	Reference
Method introduction	What is a case study (in social sciences) but works well in operations management as well	Yin (2012)
	Overview of case study research	Volmar & Eisenhardt (2020)
	The current state of the art of case study research approach in operations management	Ketokivi & Choi (2014)
Specific method questions	Designing strategies for case analysis (in organisational research)	Ketokivi & Mantere (2010).
	How to prepare a protocol	Rashid et al. (2019)
Results and impacts	How to generalise results from (multiple) case studies?	Eisenhardt (1989)

Table 6. Design science approach and action research.

Aspect	Topic	Reference
Method introduction	What is design science?	Johannesson & Perjons (2014).
	How design science approach has been used in information systems?	Hevner et al (2010)
	Design science in the field of operations management	Holmström et al (2009)
Specific method questions	Action research and design science	Järvinen (2007)

Table 7. Survey methods.

Aspect	Topic	Reference
Method introduction	<i>Survey research methods</i>	Fowler (2013).
	<i>Sample size</i>	
	<i>Statistical models</i>	

Table 8. Computer simulations.

Aspect	Topic	Reference
Method introduction	Computer simulation method in operations management	Davis et al. (2007)
	General introduction on computer simulation	Banks (1998).
Results	Examples of how simulation has been used to solve industrial problems	de Sousa et al (2019).

Table 9. Decision support systems.

Aspect	Topic	Reference
Method introduction	<i>Quantitative methods in operations management</i>	Bertrand & Fransoo (2002)
Method types	<i>What are the typical approaches used to solve industrial engineering problems</i>	Shannon et al (1980).

Table 10. Thesis works mapped to research approaches.

Thesis work	Case study approach	Design science approach and action research	Survey methods	Computer simulations	Decision support systems
Bening Mayanti (2023). "Toward circularity : life cycle-based approach in waste management"		X			X
Daniel Sahebi (2023). "Improving competitive advantage in 3PL companies in Iran"	X		X		
Javad Rouzafzoon (2023). "Development of transportation and supply chain problems with the combination of agent-based simulation and network optimisation"				X	X
Yrjö Rinta-Jouppi (2003). "Development of offshore wind power price competitiveness using a new logistics construct"					X
Petri Kärki (2012). "The impact of customer order lead time-based decisions on the firm's ability to make money: case study: build to order manufacturing of electrical equipment and appliances"	X	X			

5.2 Permissions

Journal submissions may require different permissions and acknowledgements before accepted publication or, in some cases, already in the first submission phase.

- Case study consent – With regard to action research or case studies, some journals require permission from the companies mentioned in the paper or can be otherwise identified. This can be part of the case study protocol of the study.
- Joint publications are encouraged. However, in the case of two doctoral students co-authoring a paper, it should be noted and agreed beforehand whether either one will include the paper in the thesis. The same paper cannot be part of two thesis works.
- Author contributions – Each author should be involved in work related to the manuscript and be fully aware of the submission of the paper and accept it. In the case of multiple authors, some journals require a statement from each author about the exact role of each author. CRediT (2023) is a Contributor Roles Taxonomy system developed to express author contributions systematically. The roles can be

related to concept development, method design, validation, analysis, resources, writing, reviewing, editing, supervision, etc. In a doctoral thesis, the supervisor is typically mentioned as the last author of the paper.

- Acknowledgement of funding is a requirement by many funding agencies and societies. It is also a polite way to thank for the financial or any other type of support.

5.3 Plagiarism

Plagiarism and self-plagiarism are important concepts to understand and distinguish from fair use of text (Samuelson, 1994). All doctoral students have had education about these themes during their masters level studies, and doctoral programmes include parts discussing ethical issues. Quoting any text more than three words should include parentheses and citations to the source. In addition to everything else that is being repeated during the studies, some practical advice should be given:

- Do not submit the same manuscripts to multiple journals before receiving decisions individually.
- Perform plagiarism analysis before sending the manuscript to a journal to ensure you have not forgotten any working draft text without a citation. This is important, especially with the literature review type of papers. Sometimes, similar references may be cited in other published literature reviews, generating a high similarity number.
- Submitting an extended version of the conference paper to a journal is recommendable. However, you should cite or otherwise acknowledge the earlier version of the manuscript. Many journals also state a maximum number that similar parts that can be shared with the earlier version. Check this instruction from the author's instructions and rewrite the text when expanding the contents.

5.4 Use of AI Tools

The use of artificial intelligence (AI) tools is a hot topic in the academic community, and regulations are still in shaping. Large language models such as Chat GPT, Bing, and Bard have demonstrated impressive possibilities to generate text and even graphical presentations of data. As the process is a somewhat black box for the end-user and the

models often yield incorrect text from the information content point of view, such tools have many risks.

Many journals have taken a policy on using AI tools, and reading author instructions is a good starting point when planning to write a paper. Typically, the instructions say that AIs, such as ChatGPT, cannot be considered authors and should be used only to improve writing the text, not generate the actual content. Also, the use of AI tools should be also mentioned in the text.

Example – Elsevier Supply Chain Analytics Journal - "*Declaration of generative AI and AI-assisted technologies in the writing process. During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.*"

AI tools are powerful systems that can help authors process their thinking further. AIs can operate as sparring mentors and suggest some potential thinking processes. Currently, many language model-based AIs do not have access to the internet and are restricted to the knowledge base of the training material covering information from the past and excluding any new items. The situation is developing quickly, and this is expected to be changed.

Perplexity.ai is a specific purpose of artificial intelligence worth mentioning (see Figure 6). It has access to academic journal papers and can generate answers to more complex questions. It can provide sophisticated outputs such as tables and cross-analysis. The references cited should be checked to verify the outputs of such AI models. Bing and Perplexity.ai enable this feature, but older versions of ChatGPT, for example, 3.5, do not have this and are known to generate completely fake references in the language model.

The screenshot shows the Perplexity AI interface. The search query is "What are some of the emerging themes in innovation research". The results include a "Quick Search" section with several relevant links, an "Answer" section with a numbered list of 12 emerging themes, and a "Related" section with three additional questions. A "Cookie Policy" notification is visible at the bottom right.

Perplexity

Anonymous Like Untitled Share

New Thread Ctrl I

Home Discover My Threads Login Sign Up

What are some of the emerging themes in innovation research

Quick Search

- Emerging Research Them... wiley - 1
- (PDF) The open innovation... researchgate - 2
- A look at the focus shift in... nih - 3
- The open innovation... tandfonline - 4
- The Open Innovation... surrey - 5
- Discovering Themes and... mdpi - 6

Answer

Based on the search results, here are some of the emerging themes in innovation research:

1. Open innovation
2. 3D printing and innovation
3. Internet of Things (IoT)
4. Big data/analytics and innovation
5. Digital innovation management
6. Digital transformation management
7. Digital transformation of innovation and entrepreneurship
8. Civic and social innovations
9. Service innovation
10. Sustainability
11. Innovation policy
12. Smart specialisation

According to [3], some topics such as "research and development," "technology," and "firms" may be well developed and gradually become basic themes in innovation research. At the same time, "performance," "knowledge," and "impact" are also at the boundary between the third and fourth quadrant, representing that these characteristics may evolve into basic themes from emerging topics in terms of innovation-related studies. Additionally, [6] provides a detailed analysis of emerging themes and trends in digital transformation and innovation research, including diffusion and adoption of innovation and technology, digital innovation management, digital transformation management, and digital transformation of innovation and entrepreneurship.

Related

- What are some recent case studies in open innovation research +
- How are emerging technologies like AI and blockchain impacting innovation research +
- What are some of the challenges facing innovation research in the current business landscape +

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Figure 6. Perplexity.ai answers a question on emerging themes of innovation research.

Elicit is another web service that can support literature searches with natural questions (see Figure 7). The AI engine provides an answer to questions based on academic literature

base. Elicit also has a functionality to propose similar questions related to the original one. In addition to literature summary generation, the tool is quite useful for advanced search.

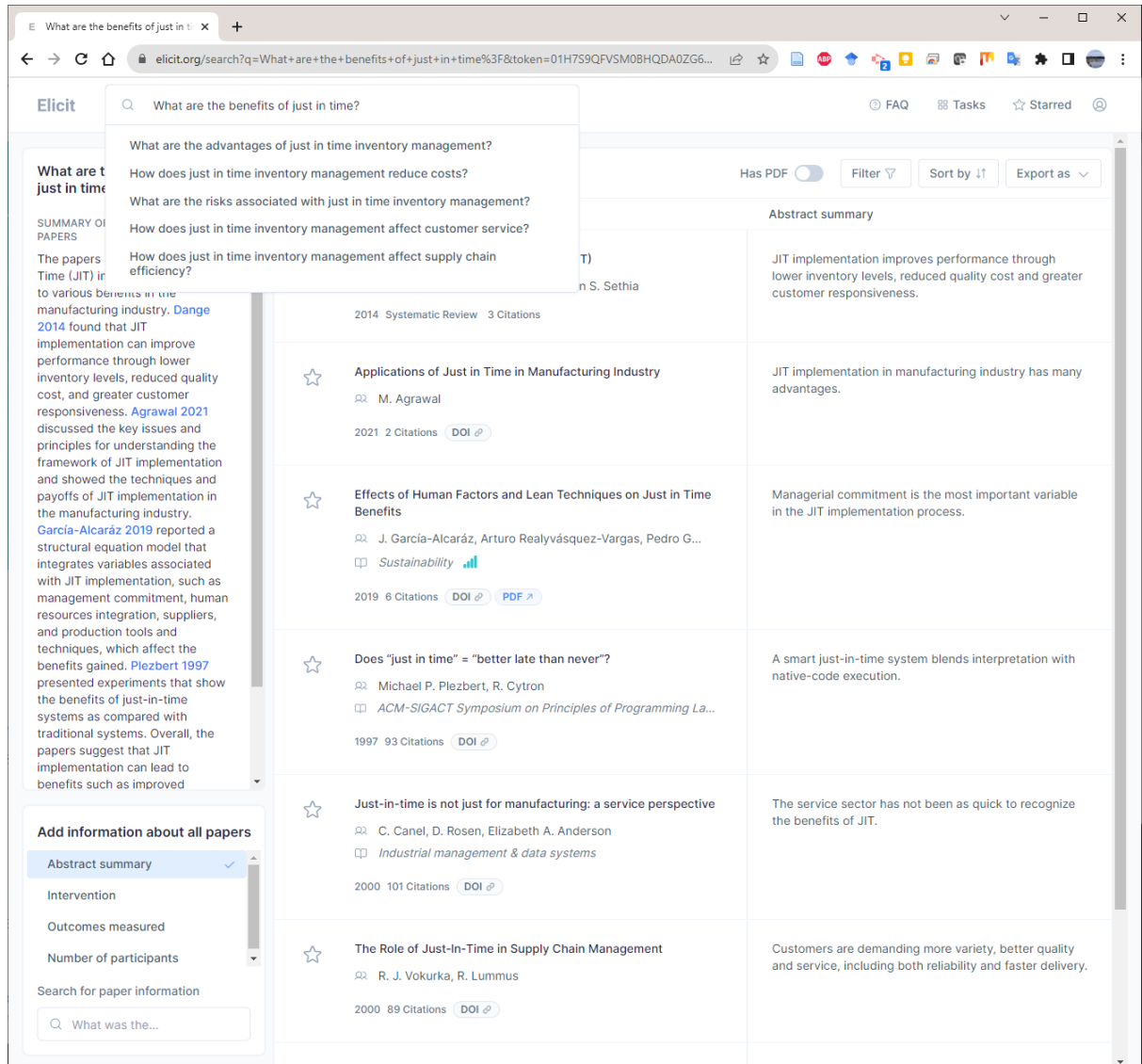


Figure 7. Elicit.org literature analysis with AI.

6 ACADEMIC CONFERENCES

Academic conferences present a good opportunity to build networks in the academic community and see the current topics of discussion and debate. Attending a conference typically requires a presentation of your own work, at least if the university covers the registration fee and the travel. Conference papers are published in a conference proceedings book and get an ISSN/ISBN number. In some cases, conference publications may end on a journal publication too.

6.1 Attending a conference

Presenting a paper is typically a 15-minute time-limited slot with 5 minutes for comments and questions from the audience. The conference tracks are built so that similar themes and researchers are in the same stream of presentations. Conference papers are often shorter papers compared to journal papers. Sometimes, editors may invite you to submit an extended version of the conference paper to a journal.

Networking means meeting other people working on similar areas and sometimes meeting people who have written a paper you have read and cited. During the conferences, sometimes special sessions for doctoral students may be organised, tutorials for tools, meetings sessions with journal editors and sometimes recruitment meetings as well. It is recommended for all doctoral students to attend at least one conference during their studies. If travelling is difficult, there are also conferences with virtual participation available.

6.2 Choosing a conference

Choosing a conference is balancing several issues – topics covered, publishing opportunities, the society behind the event, the timing of the event, and the possibility of travelling to a certain location. Academic conferences typically occur in the summer months, June, July, and August or at the end of the year, December. Between abstract submission, full paper submission and acceptance is around half a year. Conferences are organised by research societies around a certain theme or topic or by universities and companies. The large conferences are organised annually or every two years with a conference theme but split into several parallel sessions with dedicated themes. Examples of large conferences dealing with multiple areas of production/operations are EUROMA and ICPR. These conferences attract hundreds of participants. There are also smaller, more specific, very good conferences, which might have a shorter history. These events are organised by one or two universities. Smaller events can include only 50-100 partners, but

this does not mean the quality would be less. Sometimes, smaller events have specific themes and a good possibility to publish in a respectable journal.

When it comes to publishing your research, a conference can be a milestone within the process, or it can be an endpoint if a particular conference has a proper peer review system and publishes proceedings that are JUFO-rated¹. However, submitting a paper to a conference can offer numerous benefits for doctoral students even though a conference is not JUFO-rated and does not offer publishing opportunities. Conferences allow researchers to share their latest findings, research papers, and studies with a wider audience. It facilitates the dissemination of knowledge and promotes the exchange of ideas.

Conferences bring together experts, scholars, and, in some conferences, professionals from around the world who share similar interests. Attending conferences allows you to establish new connections, build relationships, and collaborate with like-minded individuals. Presenting your work at a conference allows you to receive valuable feedback and constructive criticism from peers and experts. It can help you refine your research and improve the quality of your work. Moreover, it will enhance your communication and presentation skills. It provides an opportunity to learn how to convey complex information clearly and engagingly. Conferences also give visibility for yourself and your research within your academic community and beyond. This exposure can lead to collaborations, invitations to contribute to special issues or publications, and potential career opportunities.

Conferences often feature keynote speakers, workshops, and panel discussions on the latest trends, developments, and breakthroughs in a particular field. Attending these sessions helps you stay updated with the current state of your area of interest.

A word of warning must be said about fake conferences. It is a novel concept, but there are professional web pages of events that collect money and look professional from a distance. The conference may look at a professional event, often on a very specific and hot topic, e.g., "additive manufacturing", "blockchains" or something similar, often located in a large international city or even close to some holiday resort. However, there is a chance that conference will not be organised at all or there are in practice real participants. To avoid such a situation, it is a good idea to check the organising company, any other ongoing conferences, and the names of the scientific board. Good conferences publish proceeding books with ISBN numbers or are associated with academic journals.

¹ For the latest JUFO-rankings, which change every year, check the web page in reference - Luokitteluperusteet.(n.d)

Table 11 below lists some conferences, symposiums and academic meetings organised by reputable organisers. The order of events is random and not according to any ranking.

Table 11. List of reputable conferences.

Abbreviation	Name	Organising body
EUROMA	EurOMA Annual Conference	European Operations Management Association
ICPR	International Conference on Production Research	The International Foundation for Production Research (IFPR)
POMS	POMS Annual Conference	Production and Operations Management Society
AOM	Academy of Management Annual Meeting	Academy of Management
WSPE	International Working Seminar on Production Economics	University of Innsbruck
CAIE	International Conference on Computers and Industrial Engineering	Computers and Industrial Engineering
INFORMS	INFORMS Annual Meeting	Institute for Operations Research and the Management Sciences
NOFOMA	NOFOMA Annual Conference NORDLOG Doctoral Workshop	Nordic Logistics Research Network
IEEM	International Conference on Industrial Engineering and Engineering Management	IEEE TEMS Hong Kong Chapter IEEE TEMS Singapore Chapter
ISPIM	ISPIM Innovation Conference	International Society for Professional Innovation Management
RDM	RD Management Conference	Research and Development Management Association
DRUID	Druid Conference	DRUID Society, admin by the Department of Strategy and Innovation, Copenhagen Business School
EU-Spri	EU-Spri Annual Conference	European Forum for Studies of Policies for Research and Innovation
EURAM	European Academy of Management	The European Academy of Management Society
IEOM	Industrial Engineering and Operations Management	IEOM International Society
CIMS	Cambridge International Manufacturing Symposium	University of Cambridge, IfM Centre for International Manufacturing
ICIL	International Conference of Innovation and Logistics	International Society of Innovation and Logistics

6.3 Doctoral workshops and courses

Participation in doctoral workshops and courses is also warmly recommended. These events are typically organised on-site or sometimes online and present a good opportunity to meet people working on similar topics. Often, you can find interesting doctoral workshops organised before a conference when participation is easy to combine with conference travel. Some doctoral schools which can be warmly recommended include:

- Graduate School of Logistics and Supply Chain Management (L&SCM)
- European Advanced Studies in Management (EIASM)
- Information Technology INFORTE.FI
- The Finnish Doctoral Programme in Stochastics and Statistics (FGSS)

7 PUBLISHING IN JOURNALS

Publishing in a journal is a task every doctoral student should be involved with, at least some part of the studies. Many students plan to create a doctoral dissertation around three to five published manuscripts, where at least key papers are published in a reputable journal. In the case of monograph work, it is still recommended to publish the key results of the work during the studies and get some feedback for the work.

Publications are important in academia today. But one should keep in mind that publication is just a report stating the actual study conducted. What is important is to have relevant questions, understand prior works, have a sound plan how to study, have some meaningful empirical data, and then by applying scientific methods, yield some results, which can help answering the research questions and solving the research problem. A publication is a mere short report of this. Studies are important, not papers.

7.1 The hard competition

Publishing in a journal is a useful experience to understand how the scientific review process works. The experience may be harsh for the first time and perhaps in the future. Journals are managed by the editors-in-chief, who look at the submitted manuscripts, evaluate the paper's scope and quality, and then decide whether the paper should be sent for the actual peer review process.

The competition among journal papers is tough. According to publisher Elsevier, the average acceptance rate (the ratio between accepted papers to the number of submissions) to all Elsevier journals in 2022 was 14.2%. Less than one out of five papers is accepted, including journals with less competition and the top journals. The average decision time in 2022 was 2.2 weeks, and 3.6 weeks for the final decision. However, there is a lot of variability, and the number may seem low as a good share of papers are desk rejected by the editor. For example, the International Journal of Production Economics had a review time of 7.5 weeks in the same year, and the International Journal of Production Research had speed of 59 days from submission to the first post-review decision. Commonly, good journals tend to have two to three review rounds and at least two or three reviewers for each paper.²

For a doctoral student planning to publish five journal papers in five years, this all means tight deadlines and a high probability of the need to resubmit papers to several papers.

² These figures were retrieved from a web page Elsevier Journal Metrics Visualization (n.d.). Many journals publish these numbers periodically. For latest figures, refer to fresh numbers on the publishers pages as things develop during the time.

7.2 What are the relevant journals?

Figuring out the top journals and the relevant journals takes place when starting to work with the literature review and reading all the papers related to the field and the theory of the study. Once you consider publishing your work, this question is revoked.

There are many types of journals. Reputable academic journals are backed by established academic publishers or academic associations around certain themes. In some cases, even both. Reputable academic publishers include companies such as Elsevier, Taylor and Francis, Emerald, Blackwell, Wiley, and Springer. These companies have a long tradition and experience of publishing works and maintaining indexing for citations and journal rankings. Academic associations could include societies, for example, IEEE publishing a great range of journals, professional magazines and conference proceedings; the International Society for Production Research, ACM in computing, and the European Operations Management Association.

There is also an increasing number of journal scams, journals publishing anything paying the submission fee, not operating with the review process, or using non-accepted practices. Some of these journals are blacklisted, and there are registries of journals using predatory practices. Beall's List catalogues such publishers, and the list can be found on the internet (Beall's List, 2021). As competition is tough in publishing, journals are ranked in many ways. The national journal ranking in Finland, JUFO, ranks journals in categories – from bottom to top – 1, 2, and 3. Levels 2 and 3 may include a maximum of 25% of the journals, and level 3 journals may include a maximum of 10% of those in level 2. The rankings are done in expert panels. Similar rankings are presented in business school journals and other countries worldwide (Australian Business Deans Council, AACSB Journal Rankings). Very often, the rankings correlate positively with each other along with the other metrics such as impact factor.

Impact factors present a bit more transparent way to rank journals. Journal impact factor (IF) is a number calculated as the average citations of a paper from all published papers in that journal from the past two years. This metric is calculated by Clarivate company, but Google Scholar uses similar internal metrics. To understand citation dynamics, one must acknowledge that nearly half of the papers published do not get any citations. The number of citations also depends on the community size. More people are working in the field of medicine compared to history, for example. In the same way, there are more people in the “innovation management” field than in the “theory of constraints”. The Journal of Operations Management is one of the top journals, with an impact factor of 6.72 (2023), the International Journal of Production Economics has 11.251, the International Journal of Logistics Management 7.5 and so on. The number itself is not that important, but any

impact factor number shows that the journal has been around for several years and is a serious one.

University financially rewards publications published in JUFO 2 or 3, so it is nice to aim at those JUFO rankings. However, rankings are not always aligned with the journal impact factor. Sometimes there is a good reason for that. Particularly predatory publishers are good at manipulating impact factors by demanding authors to cite the journal during the process. JUFO rankings are evaluated regularly but Finland is a small country and JUFO panels are prone for politics. Panel members may have reasons to talk up journal ranking if having own or close team member publications in a specific journal. So, find your balance between the impact factor and JUFO ranking. On top of JUFO rankings and IF, also FT50 list is relevant. Particularly scholars aiming to work at a highly ranked business school are expected to have ambition level and demonstrated capability to publish in FT50 journals.

Creating an exhaustive list of relevant journals in the field of operations management and industrial engineering is a challenging task. Below are the tables (Table 12-22) showing the lists of journals with their publisher names and impact factors from the past year to show one way to categorise the journals in a certain way. These lists represent one possibility to cluster journals into certain subject areas, but there are many other ways. Discussing with your supervisor(s) before selecting a target journal for your paper is always beneficial.

Table 12. Journals related to generic areas of operations management.

Abbreviation	Name	Publisher	Impact factor 2022
IJPE	International Journal of Production Economics	Elsevier	11.251
IJPR	International Journal of Production Research	Taylor and Francis	9.2
JOM	Journal of Operations Management	Wiley	6.720
POM	Production and Operations Management	Wiley	5.0
IJIEOM	International Journal of Industrial Engineering and Operations Management	Emerald	N/A

Table 13. Innovation and technology management journals.

Abbreviation	Name	Publisher	Impact factor 2022
Technovation	Technovation - The International Journal of Technological Innovation, Entrepreneurship and Technology Management	Elsevier	12.5
JPIM	Journal of Product Innovation Management	Wiley	9.885
RP	Research Policy	Elsevier	9.47
TEM	IEEE Transactions on Engineering Management	IEEE	8.702
RP	Research Policy	Elsevier	7.2
JKM	Journal of Knowledge Management	Emerald	7
RDM	R&D Management	Wiley	6.3
TEM	IEEE Transactions on Engineering Management	IEEE	5.8
JTT	The Journal of Technology Transfer	Springer	4.8
TASM	Technology Analysis & Strategic Management	Taylor & Francis	3.4
IJTM	International Journal of Technology Management	Inderscience	2.8
JED	Journal of Engineering Design	Taylor & Francis	2.7
IJIM	International Journal of Innovation Management	World Scientific	2.1
SE	Systems Engineering	Wiley	2.0
TTS	IEEE Transactions on Technology and Society	IEEE	1.5
TEM	IEEE Transactions on Engineering Management	IEEE	5.8

Table 14. Production and manufacturing related journals.

Abbreviation	Name	Publisher	Impact factor 2022
JMS	Journal of Manufacturing Systems	Elsevier	12.1
PPC	Production Planning and Control	Taylor & Francis	8.3
JMTM	Journal of Manufacturing Technology Management	Emerald	7.6
JIM	Journal of Intelligent Manufacturing	Springer	7.136
IJLSS	International Journal of Lean Six Sigma	Emerald	4
IJAMT	The International Journal of Advanced Manufacturing Technology	Springer	3.4
FSMJ	Flexible Services and Manufacturing Journal (formerly Int.J.Flexible Manuf. Sys)	Springer	2.7
IJQSS	International Journal of Quality and Service Sciences	Emerald	2.6
IJQRM	International Journal of Quality and Reliability Management	Emerald	2.5
TQM	The TQM Journal	Emerald	N/A

Table 15. Additive manufacturing-related journals.

Abbreviation	Name	Publisher	Impact factor 2022
AM	Additive Manufacturing	Elsevier	11
RPJ	Rapid Prototyping Journal	Emerald	3.9
ADDLET	Additive Manufacturing Letters	Elsevier	N/A
PAM	Progress in Additive Manufacturing	Springer	N/A

Table 16. Journals related to supply chain management.

Abbreviation	Name	Publisher	Impact factor 2022
JSCM	Journal of Supply Chain Management	Wiley	10.6
TR:E	Transport Research: Part E Logistics and Transportation Review	Elsevier	10.6
IJOPM	International Journal of Operations and Production Management	Emerald	9.9
SCM: IJ	Supply Chain Management: An International Journal	Emerald	8.8
JBL	Journal of Business Logistics	Wiley	7.875
IJLM	International Journal of Logistics Management	Emerald	7.5
IJPDLM	International Journal of Physical Distribution and Logistics Management	Emerald	6.7
IJLRA	International Journal of Logistics: Research and Applications	Taylor and Francis	6.6
JPSM	Journal of Purchasing and Supply Management	Elsevier	6.1
IJSTL	International Journal of Shipping and Transport Logistics	Inderscience	1.5
SO: IJ	Strategic Outsourcing: An International Journal (formerly Journal of Global Operations and Strategic Sourcing)	Emerald	N/A
TRIP	Transportation Research Interdisciplinary Perspectives	Elsevier	N/A

Table 17. Operations research and other quantitative approaches.

Abbreviation	Name	Publisher	Impact factor 2022
ESWA	Expert Systems with Applications	Elsevier	8.5
DSS	Decision support systems	Elsevier	7.5
Omega	Omega: The International Journal of Management Science	Elsevier	6.9
EJOR	European Journal of Operational Research	Elsevier	6.4
AOR	Annals of Operations Research	Springer	4.8
SDR	System Dynamics Review	Wiley	4.8
SMPT	Simulation Modelling Practice and Theory	Elsevier	4.2
JoS	Journal of Simulation	Taylor & Francis	2.5

Table 18. Management science journals.

Abbreviation	Name	Publisher	Impact factor 2022
AMR	Academy of Management Review	AoM	13.9
JOM	Journal of Management	Sage	13.5
ASQ	Administrative Science Quarterly	Sage	12.5
AMJ	Academy of Management Journal	AoM	11.0
JMS	Journal of Management Studies	Wiley	9.7
LRP	Long Range Planning	Elsevier	8.5
SMJ	Strategic Management Journal	Wiley	7.8
AMD	Academy of Management Discoveries	AoM	6.5
OS	Organisation Studies	Sage	6.5
MS	Management Science	INFORMS	5.4
ORGSCI	Organization Science	Informa	5.2
SJM	Scandinavian Journal of Management	Elsevier	2.4

Table 19. Journals related to technology and digitalisation.

Abbreviation	Name	Publisher	Impact factor 2022
IJRCIM	International Journal of Robotics and Computer Integrated Manufacturing	Elsevier	10.4
CII	Computers in Industry	Elsevier	10
CIE	Computers in Industrial Engineering	Elsevier	7.9
EIS	Enterprise Information Systems	Taylor & Francis	4.4
IMDS	Industrial Management and Data Systems	Emerald	5.5
IJCIM	International Journal of Computer Integrated Manufacturing	Taylor & Francis	4.1

Table 20. Circular economy themed journals.

Abbreviation	Name	Publisher	Impact factor 2022
RCR	Resources, Conservation and Recycling	Elsevier	13.2
SPC	Sustainable Production and Consumption	Elsevier	12.1
JCP	Journal of Cleaner Production	Elsevier	11.1
JEM	Journal of Environmental Management	Elsevier	8.7
WM	Waste Management	Elsevier	8.1
ER	Environmental Research Letters	IOPScience	6.7
J Ind Ecol	Journal of Industrial Ecology	Wiley	5.9
WMR	Waste Management and Research	SAGE	3.9

Table 21. Energy journals.

Abbreviation	Name	Publisher	Impact factor 2022
RSER	Renewable and Sustainable Energy Reviews	Elsevier	15.9
AE	Applied Energy	Elsevier	11.2
Energy	Energy	Elsevier	9
EP	Energy Policy	Elsevier	9
SE	Solar Energy	Elsevier	7.2
ERSS	Energy Research and Social Science	Elsevier	6.7

Table 22. Other relevant non-categorized journals.

Abbreviation	Name	Publisher	Impact factor 2022
JCP	Journal of Cleaner Production	Elsevier	11.1
BSE	Business, Strategy and Environment	Wiley	10.8
BM: IJ	Benchmarking: An International Journal	Emerald	5.6
O&E	Organisation and Environment	Sage	5.3
PMJ	Project Management Journal	SAGE	5.0
BPMJ	Business Process Management Journal	Emerald	4.1
ESAM	Engineering, Construction and Architectural Management	Emerald	4.1
IJPPM	International Journal of Productivity and Performance Management	Emerald	3.1
JEDT	Journal of Engineering, Design and Technology	Emerald	2.8
JWL	Journal of Workplace Learning	Emerald	1.9

Publishing for the first time is quite an experience. Sometimes, compared with playing football (or soccer), the only way to learn publishing in journals is to publish in journals. It is a fair assumption that a very small number of players start their careers in world championships or Olympic games. Likewise, the competition in top journals is very intense. The requirements are set high. The empirical data of the study should be extensive, the methods applied should be of high quality and reported in detail, and the theoretical link to prior studies and the journal itself should be sound.

The special issues of journals are edited by guest editors and typically cover a specific thematic area. Sometimes, special issues attract many papers, but the problem for the guest editors is finding papers that fit the special issue's scope. Aiming to publish in a special issue may be a good opportunity to access top journals, but the first thing is to ensure that the paper is related to the theme and links to the area described in the call, which can be found on the journal web page.

There is no 'right' timeline in terms of publication during your PhD journey. One may have something published in their first year, but others have nothing until their second year. Just keep an eye on your timeline, not others. An article-based dissertation can have "ready to be submitted to the peer review process" manuscripts which are not even submitted to a journal and not under review process or published. There is even possibility to have an article-based dissertation without any published papers, but this is not recommended. Published papers make your thesis stronger and publishing is important part of being an academic and researcher. In the end pursuing a PhD is about learning to be a researcher. Having experience on the whole process or initiation research to published paper is crucial part of this learning process.

7.3 Submission process and checklist

The publishing process is often described in the editorial scope of the journal and the authors instructions. Authors should read these sections carefully, along with some past published papers, to ensure an understanding of the journal's tradition. The processes of the journals are managed by web-based online systems, which will notify the status of the process and any missing documents. Although the largest publishers cover wide range of journals, and you would assume that it is enough to register once to the publisher platform, this is (still) not the case. You have to set up an account for each journal, even if the journals are under the same publishers. Using a ORCID credentials can sometimes smoothen the login process and bumps in the usability which by no means is not in the level where it should be today.

Some journals require supplements for the submission. These could include declarations of any conflict of interest, funding received for the study, permissions for the case studies

published, description of each author's contributions, author biographies and so on. These are mentioned in the editorial system as mandatory appendices.

Prior to submission, it is a good idea to check at least:

- (1) Submission format requirements – citation styles and mandatory appendices.
- (2) Language – For any non-native speaker, using a proofreading service is recommended. Not only obvious typos but also stylistic issues can make a big difference.
- (3) Conduct plagiarism analysis, e.g., TurnItIn, to ensure that the paper has nothing more than three words cited without quotation marks and a reference. Journals use automatic plagiarism detection. The editors will immediately see a figure describing matching content, and a high number will result in immediate rejection of the submission.

7.4 Review process for journal paper

The purpose of a review is to improve the manuscript. It should not be considered as grading or ranking at all. The academic process is based on the voluntary work of editors, who do not get paid and the reviewers, who are the experts in the field – often detected based on their past published works – also not getting any compensation. The experts spend their own time reviewing the paper and, as anonymous persons, giving their recommendations and impressions based on reading, not knowing the authors or where they come from.

The best outcome of a submission is to get a notification that the editor finds the paper worth reviewing and sends it out to the reviewers. Journals use very often automatic suggestions for reviewers. This means sending invitations to persons who have authored papers cited or published with similar keywords. It is also common that in the submission system the corresponding author needs to name 3-6 reviewer suggestions and give even arguments why a reviewer would be fitting. Proposing a reviewer can be done in several ways. The most important factor should be expertise. However, if you are not submitting to a leading journal of the field, do not suggest the most famous scholar of the topic area. It is always good to cite earlier relevant works in the journal. Perhaps one of the authors in those papers could be suitable. Keep also in mind that you shouldn't have conflict of interest when proposing a reviewer. If you have more time, it is also nice to consider the balance of geographical area and gender distribution.

Once reviewers have accepted the task, they typically have some weeks to complete it and give their report to the editor. Based on two to three review reports received, the editor decides if the work has the potential to be revised as suggested by the reviewers. In case of conflicting reviews, the editor may invite more reviewers or use editorial decisions.

After this, the best outcome is to get a “revise” decision from the editor and a chance to improve the paper as suggested by the reviewers. This does not mean that the work is not good but that it is accepted for the next round. No paper ever gets accepted in the first round. So “revise” – “major revisions”, “minor revision”, or “resubmit” is the best outcome in the first round.

Reviewer comments may be hard, but the paper is not the person who submitted it. It is just the paper. Maybe the paper does not communicate well so that the reviewer would understand what you have done or meant to be said. Perhaps some things need to be justified, reported in more detail or even expanded in the empirical work. The review report is always valuable, no matter how wrong it might feel. This is the scientific process.

Once a paper has been accepted and published, one becomes a recognised author by the editorial systems. This means that you will also receive invitations to review other people’s papers...

8 FINAL STEPS – REVIEWING THE THESIS

The thesis is pre-examined by scholars (professors or adjunct professors) in the pre-examination. It is a good idea to keep this in mind during your PhD journey, and especially in the later phases, you may think about who could be potential pre-examiners and opponents for the thesis. Naturally, your supervisor will help list possible scholars and select suitable ones. In the end, it is your supervisor who will contact the pre-examiners and the opponent. It may be beneficial to select someone you have already met in the key conferences of your topic area and have a personal impression of a pre-examiner and/or opponent. Selecting a pre-examiner is quite important in various ways. As a young scholar, you get time to present your work to an experienced scholar in the field you have worked in for several years. This is an opportunity to create a professional relationship that can be helpful in many ways in the later stages of your academic career. Also, pre-examiners can be used to give seminar presentations at the same time when they travel for the defence and network with the faculty in Vaasa.

8.1 Evaluation

Once the thesis is submitted and pre-examiners are confirmed, pre-examiners will receive the thesis and evaluation instructions. They are asked to conduct the pre-examination in two months. The pre-examination will examine the following aspects of writing a 3-5 pages long report:

- (1) Choice of topic, setting the research problem and positioning the research in scientific and social debate
- (2) Theoretical mastery, conceptual clarity and conceptual-theoretical development work of the topic
- (3) The complexity of research methods used and their management, as well as the quality of research material.
- (4) Management of research results and their critical evaluation
- (5) Adherence to good scientific practice and ethically sustainable principles
- (6) Critical approach and maturity of reflection
- (7) Demonstrated personal input and independent work
- (8) Consistency, clarity of presentation and correctness of language of the dissertation

(9) Ability to create new scientific knowledge.

In addition, the pre-examiners are asked to give their opinion on whether the thesis is among the top 15 % in its field. At the end of the statement, the preliminary examiner must clearly state their view on the granting or refusing permission for a defence. Even though a defence is permitted, there can be a rather long list of proposed improvement areas. Thus, the doctoral candidate often improves the thesis on various fronts before it goes to print. With all the process steps, the typical time between the submission and the defence is about four months, but even longer periods are not uncommon.

8.2 What makes a thesis? How is the bar set?

The general quality requirements for theses at the University of Vaasa are set at the university level. The School of Technology and Innovations and Industrial Management support doctoral candidates in conducting high-quality research and theses. The thesis must contain new scientific knowledge in the field of industrial management. Even when the papers of the thesis are considered individually, each paper must contain new results or perspectives and papers are examined separately in the pre-examination. The novel results must be clearly presented and meet the criteria set for scientific writing. Furthermore, the thesis must demonstrate critical thinking, mastery of research methods, and the ability to apply research methods. The thesis should be written in a language approved by the university. Most theses today are written in English.

You can choose between monograph or article-based dissertation. Article based dissertations are the most common nowadays. Discuss with your supervisor about your thought on the PhD format. In case of monograph thesis, publishing at least one or two papers is something highly recommended.

The basic requirement regarding a compilation dissertation may consist of peer-reviewed articles already published or approved for publication or previously unpublished manuscripts that are in the scientific peer review process or ready to be submitted to the peer review process. In other words, all papers do not need to be published or peer-reviewed.

It is common for the papers in the dissertation to be co-authored. Thus, the independent contribution to each research paper should be clearly stated and significant in each paper included in the thesis.

It is important to think of the dissertation as an entity. Although there are no official requirements for the author order of the papers, and none of the papers are required to be written by a single author, the number of authors and author order matters. For example,

suppose the candidate includes the minimum number of articles (check the current instruction from official requirements as the number and JUFO level requirements may vary) and is a member of a large author group with a relatively minor role in each paper. In that case, this may be an issue when considering whether the thesis fulfils the requirement of a doctoral thesis. It should also be noted that published papers do not guarantee that the thesis meets the criteria for a doctoral thesis. The quality of publishers varies, and some peer reviews are far from being rigorous. Thus, in the end, it is the role of the pre-examiners to evaluate whether all the requirements of the thesis are met and whether the thesis ultimately fulfils a quality level that is commonly understood as a bar for a doctoral thesis.

It is always beneficial to compare one's work to others. This implies both the articles and the thesis as a whole. By familiarising yourself with the accepted thesis at Industrial Management, you can get a fairly good picture of what makes a thesis and where the bar is set.

Discuss these requirements further with your responsible supervisor. Your supervisor has the best view of the maturity of your thesis.

9 RECOMMENDATIONS

In the end, we would like to give some practical guidance to everyday work. Your PhD journey is unique. In the end, no one will tell you how to do things and what fits best for you. You must develop your working arrangement and style and manage your work independently. This won't happen immediately, and failure will be one of your closest buddies.

In a professional life there are rare occasions when you can focus to a particular problem with significant time (years), get deep in the existing knowledge and create new. Pursuing a PhD is such a period in life. Enjoy this opportunity. There is high potential that your PhD time is the best time of your life or perhaps the second best. It might be hard to beat times of the bachelor and master studies and those fresh feelings of freedom and unlimited possibilities, but you can get close.

Review processes can be challenging, and publishing can be quite painful. So, it is normal that at a times you feel awful, but things get easier over time. Remember to talk and hang out with other (PhD students), and make sure you have fellows in the same boat of misery. You can join an online study room organised by PhD Forum³ where you can be virtually together with people from academia around the globe.

It is good to keep in mind possibilities to have shorter and longer research visits. They can be an eye-opening experience. These visits require funding but typically that is not impossible to solve. Foundations can be for great help. Particularly longer visits, from few months to a year can help to get good understanding how peer universities work and organise their research and teaching. You can great very valuable connections that can be utilized in co-authoring, creating a research proposal for research projects later on, etc. For a PhD candidate focusing to management issues, for example Scancor could be a great opportunity. For innovation studies, SPRU at University of Sussex has a well-designed process to take in visitors. For visits you need connections to visiting universities but here your supervisor(s) and colleagues can help to open the doors.

When you write, have your first draft instead of trying to fix a particular paragraph or section to perfection. Write parts of the text that feel easy in the beginning. Typically, your thought develops and you get ideas to solve more difficult parts and you can move to them next.

Keep in mind work life balance. The PhD process is not meant to kill you. Don't feel guilty for taking a break. Reserve suitable time to do things properly and take time to think. No

³ PhD Forum - <https://www.thephdforum.com/study-room>

one needs to do a literature review 24/7. Bake some cake, watch some TV series, or take a walk.

You don't have to prove yourself. Not to your supervisor or your parents. Getting a PhD is not the right vehicle to get approval from people from whom you haven't got approval but wished so.

It is normal to have ups and downs during the journey. It is normal to be stressed sometimes. But if you feel that something is not okay and you feel overly stressed or even burnout, it is time to think and find help. We can't provide a comprehensive guide for recognizing the point when external help is needed. But it is essential to recognize signs early to take appropriate steps to manage stress and prevent burnout.

Overly stressed or experiencing burnout can manifest through various physical, emotional, and behavioural signs. Common physical signs are for example fatigue, headaches, digestive issues, insomnia, changes in appetite and muscle tension. Emotional changes are common. You may notice increased irritability, anxiety, depression, reduced concentration, and lack of motivation. Behavioural changes include social withdrawal and isolation, decreased productivity, and neglecting self-care. Stressed persons may lack empathy and have increased conflicts and disagreements with colleagues, friends, or family members. There can be feelings of isolation. Also neglecting important relationships due to work-related stress or burnout is common. Talk to your supervisors about your work-related struggle.

You can find updated information about studies and requirements from the graduate school pages and study guide. From these sources you can find information about needed credits and compulsory courses. You can also contact graduate school via email. For content related questions, research plan and doing research, your supervisor is the right contact.

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