Ten guidelines for writing a master thesis within the 420D research group

1. **Before you start:** Before you start writing your thesis, it is important and useful to have prepared a thorough thesis proposal that will guide you through the master thesis process. The proposal sketches out the most important components of the thesis and it also provides a "scope of work" (what is included in the thesis and what not, i.e., what is beyond the scope). In the proposal you will identify one or multiple research questions ("What do you want to answer?") which are linked to an overarching research objective ("What is the objective of the thesis?").

   The research questions are ideally motivated by a research gap, that is knowledge gap you aim to fill with the findings from your thesis. The research gap is identified by screening or reviewing the scientific literature on Scopus, Web of Science and google scholar. However, be careful with the latter database, as it also contains non-peer reviewed literature (so called "grey literature" such as reports, working papers, etc.) that could proof to be unreliable or even untrue.
   Be careful: Posing a good research question requires good care. The question has to be a single sentence, the answer must be unknown, the answer cannot be a single "yes" or "no" and the question must be answerable within the given time.

   Furthermore, the proposal will identify what materials (i.e., in most cases data such as secondary data from existing sources like household surveys or primary data from interviews that you conduct yourself) you will use and with which methods (i.e., tools to process, analyze and make sense out of your data). Last but not least, the proposal will include a time table that lays out which activities (literature review, data collection, data analysis, write-up of thesis chapters, etc.) are planned in which time period. There is a separate proposal writing guideline that you should check out.

2. **Master thesis length:** As a rule of thumb, a master thesis should have between **10,000 to 13,500 words**. This excludes the title page and any list of contents, figures, tables and so on. It also excludes the list of references and any supplementary materials or appendices. Writing a long thesis is easier than a short one, because writing in a concise manner requires removing redundancies and "cutting to the chase". It does not reflect well upon a thesis if the reader repeatedly gets the impression that certain things are mentioned over and over again. If you plan to write more than indicated above (because your specific thesis requires to do so), please clarify with us with beforehand.

3. **Master thesis format:** Use a nicely readable font. We recommend boring, old Times New Roman font – because it is a serif font[1]. Font size 12 is recommended and a line spacing of 1.5. Justified text blocks are recommended, but left aligned is also fine. Leave enough margin on each page, at least 2 cm on each side. Make use of the format templates to format the chapter headlines. Do not go beyond three levels of numbered headlines (e.g. 1., 1.1. and 1.1.1 is fine but not 1.1.1.1). If a second level of headline is started you have to have at least two sections at that level (e.g., so if in chapter 1 there is a sub-section 1.1., then logically there also has to be a sub-section 1.2 – otherwise the first sub-section is simply a part of chapter 1 without a separate headline).

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[1] If you do not know, google the difference between *Serif* and *Sans Serif* font types and learn why the former is better for long texts than the latter. For presentations, *Sans Serif* like Arial are again better,

4. **Master thesis structure:** We recommend a "classical" structure as explained in the following. However, every thesis deviates from the norm and you may need different chapters (e.g., some describe the study context in a separate chapter, others include it in the introduction).

   a. **Abstract:** The abstract is a stand-alone summary of your thesis and should be written as the last thing (even after your conclusion). A nice guideline is provided by the Australian National University (https://www.anu.edu.au/students/academic-skills/research-writing/journal-article-writing/writing-an-abstract). The abstract should have a length between **150 and 300 words**.

   b. **Introduction:** The introduction shall motivate the reader to read further. Why is this thesis of relevance? What is the larger context in which the thesis is embedded in? What answers to what questions will it provide? Or what objective does it pursue? What is so new (or original) about these answers or objectives? How does this thesis add knowledge to the already existing literature?

      The introduction most often follows a "funnel logic" from the very "broad picture" (background of the problem, actual problem statement) to the specific level at which you will conduct your research (your research question or hypothesis). For example: You may start with "The world is approaching a 1.5° degree climate" and then pin it down to "How do seasonal labour constraints impact the decisions of smallholders in Kenya to adapt to climate induced changes in maize yields?".

      The introduction is often re-written at the very end, because the first version of the introduction did not fit well anymore after the remaining chapters have been written. Sometimes, the introduction also includes a "sneak preview" of the main findings – or you can be creative, it can also include a "cliffhanger". Most important, it should be rather crisp and short. The end of the introduction can also include a short paragraph explaining how the remainder of the thesis is structured. As a rough guide, a typical introduction should be between *800 to 1000 words.*

   c. **Conceptual or theoretical framework:** This chapter is optional – depending on your type of thesis. It provides either a conceptual framework that ideally is not simply re-printed from an existing study, but which is self-developed or adapted from others. The conceptual framework could for instance sketch out through which channels climate change has an impact on smallholders in Kenya. It is recommended to visualize such a framework and to – of course – use it in the subsequent course of the thesis.

      A theoretical framework is similar, but different – it could for instance be based on microeconomic theory and explain how smallholders make their labor allocation decisions. In this case, the framework would largely be expressed in mathematical terms. It can also be expressed verbally, for instance when discussing which theories exist that describes intra-household decision making. Make sure to look at other theses and studies to get some inspiration for this chapter. This chapter should not **exceed 2000 words**.

   d. **Literature review:** This chapter is optional – depending on your type of thesis. Usually, an introduction would already refer to the existing literature and explain how this thesis is connected to it. However, because the topic is quite new, or complex or controversial there may be the need for a more elaborative review of the literature which then warrants a stand-alone chapter. For instance, one may want to describe the key papers that have investigated the impacts of climate change impacts on maize yields in other regions, or with other research methods, because the findings of these studies are very context dependent.
   Given that the literature review is only a chapter of the whole thesis, you are not expected to deliver a fully comprehensive review including a Scopus query or a PRISMA graph[2]. As a rule

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[2] This would be expected in case of a master thesis that only conducts a literature review as the main objective.

of thumb, for a master thesis it is sufficient to briefly describe the 10-12 most recent and relevant papers related to your topic. Make sure to logically sort them in paragraphs and by all means avoid writing down paper summary by summary, without any logical sequence or meaningful flow of thoughts. Capturing the essence of these papers in a table or graph is a good strategy to avoid verbal repetition and to convey the most essential content. As a rule of thumb, this chapter should not be longer than ***1500 words***.

e. **Data and Methods:** This section may also be named "Materials and methods" or "Research approach" or similarly. It serves to document what data the thesis is based on and what methods were applied to analyze or process the data. Before the data and method are described in more detail, it may be useful to first present an outline ("big picture" view[3]) on how they are related to each other. The data should be presented in a clear manner: Where did you get it from? How did you collect it (if applicable)? What information does it contain? What quality does it have? What are the summary statistics? How well does it compare to the population? If the data had to be estimated or pre-processed, you may describe this in this chapter and refer the reader to the appendix for more details on the procedure.

The method presented should be both compatible with the underlying framework and the underlying data. should also be presented clearly but concisely. What kind of method is used? Who has developed this method or where can one find a more thorough description of it? What are the main features of the method? Ideally, you present the core equations and components of it – if it is a quantitative method. If it is a qualitative method, you may have to explain how you codify information. In summary, the method description has to tell the reader how the data was used to obtain an answer on the previously identified research question. If the method does not allow to do that, it is the wrong method. Taking a look at existing peer-reviewed studies in how they present their data and method may be a good inspiration. This chapter should be ***2000 to a maximum of 2500 words.***

f. **Results:** The results should be structured in such a manner that they directly correspond to the research questions or hypotheses posed in the introduction. The results section presents the key findings of your thesis including explanations of why these results are obtained ("This result is driven because households demand for this good is very inelastic". "This effect is largely due to the framework's underlying assumption that producers maximize profits"). However, the actual and extensive interpretation, critical assessment and judgement of the results is done in the subsequent discussion section (How meaningful are the results? To what extent / how clearly do they answer the research question? What are the limitations when interpreting them?).

When doing the analysis, it is helpful to already have in mind which figures or tables you want to present in the results section. Sometimes a lot of results are presented in verbal form, but it would be better to present that in a table or figure. In other instances, rather obvious information is presented in a large pie chart, which could have been presented in one sentence. So, critically reflect how you present the results. For some it may make sense to first prepare a power point file in which you prepare a (hypothetical) oral presentation of the results[4] – this will allow you to prioritize and to logically structure your "results story". Then based on these slides, you will likely find it much easier to write down your results section.

Depending on your method, the results section may also include a sub-section on sensitivity analysis or robustness checks – in these sections you reassess your results when deviating key parameters or model specifications. The results section should **not exceed 3000 words**. Typically, it ranges between 2000 and 2500 words. Note: Captions of figures and tables, and the content of tables themselves are included in the word count.

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[3] This and some other elements of this guideline are taken from Prof. Hess/Prof. Wieck outline (research group 420a & b)

[4] Obviously, these slides will also help you for the final oral defense of the thesis.

g. **Discussion:** By experience, students underestimate the time needed to write up a meaningful and insightful discussion chapters. In this section, you zoom out from the results, and you give the reader the answer to the question "So What?". You re-address your research questions, hypotheses or objectives and summarize the main findings (What is the take-home message?).

In this section, it is also the right spot to address how reliable you think these findings are, how well (or bad) they compare with the findings of other studies (and why are they similar or different?). In a sub-section "Limitations" you should reflect upon the shortcomings and caveats of your study (to what extent did you lack certain data? How suitable was your method? Which assumptions are likely to alter your results? Or how sensitive are your results after altering these assumptions? In another sub-section, you can briefly address your ideas for future research (What could have been done with more time, data, etc.?).

In a third sub-section you should identify and report the most relevant implications of your work. These can include policy implications or recommendations, implications for the research arena, or practitioners or other stakeholders (private sector, NGOs…). The discussion section should not exceed **2500 words**.

h. **Conclusion:** So, what conclusion do you draw from your thesis? Imagine, you are asked to give an elevator pitch (or presentation) in one or two minutes. You probably need to quickly summarize what your research question is, how you approached it and what key findings and insights you were able to generate. You may also want to identify what remains open or what key limitations you were not able to address. Then you briefly highlight the key contribution of these findings for research, policy other stakeholders (Whom does this thesis benefit?). The conclusion should have between **300 and 500 words**.

5. **Use of tables and figures:** Make sure to use visualizations (e.g., Word's smart art graphs, ggplot in R, draw.io) to communicate your research approach or your findings. In total, the sum of your figures and tables in your main text should not exceed 12 (so you may have 6 figures and 6 tables, or 12 tables or 12 figures, but not 12 figures and 12 tables!). Any additional tables and figures can be presented in the appendix. It is important to prioritize! Each table and figure should be able to stand for itself, so the caption has to provide all necessary information and explanations.

6. **Research tools:** Make sure to use a citation manager like Citavi (University of Hohenheim provides it for free) or freeware software like Zotero. You are free to use any tools (except hiring a ghostwriter). This includes generative artificial intelligence tools such as chatGPT, Perplexity and other tools. However, in these instances you have to declare the use of these tools (see AI declaration sheet). For probably all research methods, there are handbooks, textbooks, blogs and the like on the internet which will allow you to get started and troubleshoot. Be aware that some tools, like writing the thesis in LaTex, may be very fancy, but may also cost a lot of time. So, use the tools wisely! We know that artificial intelligence has changed the game, but we now scrutinize the content of a thesis more than before – so be prepared to be asked about anything that you claim to have understood or analyzed yourself.

7. **Citations and good scientific practices:** Whenever you use information from somewhere else, you have to cite the source. Cite properly and make sure you know the actual source that you cite. "Direct quotes must be quoted using quotation marks and indicating name of author and page number of the quote." (Lippert et al., 2023, p. 1)[5]. You are free to choose a citation style of your choice, just make sure to apply it consistently. The list of references has to provide enough information to enable others to locate it. If you put authors as the actual subject in a text, it is fine, but then write "This was also found by Schneider et al. (2019)" – but do not write "This was found

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[5] Lippert et al. (2023) *Principles of Preparing a Bachelor or Master Thesis*. Hohenheim, Germany. Retrieved from https://projekte.uni-hohenheim.de/i410a/diplom/index3.htm

by (Schneider et al. 2019)". The last version is not a proper sentence because it lacks a subject! Also, do not mention the initials of authors in the main text. In the reference chapter, you only report the initials of the authors, not their full names.

We will check your final thesis if it contains plagiarism. Make sure you inform yourself how to properly cite and paraphrase (Prof. Thomas Berger gives an extensive introduction in the agricultural economics seminar about it). Systematic plagiarism will result in failing your thesis (grade "F"). Gross neglect of good scientific practices (e.g., very sloppy citations, isolated instance of plagiarism) will result in a substantial reduction of your grade. We also do not accept any unethical tampering of the thesis' underlying data. Every thesis needs to be submitted with the original underlying data and the necessary code that allows for a full replication of results.

8. **Read economically:** You probably are slightly overwhelmed with all the tasks waiting for you when working on your thesis. You will be on a steep learning curve. And you will need to process information efficiently. Reading papers from A to Z is a bad idea, you will end up only reading a few a day (and you will get quite sleepy!). It is only recommendable if the paper is an absolute key pillar for your thesis. You need to learn how to screen and skim through a paper in such a way that you capture the main content that is interesting to you. By full-text search you can easily find where a paper is mentioning a certain keyword that you are interested in. Software like Mendeley-Desktop allows you to do a full-text search through multiple documents at once. This can speed up the process.

9. **Learn from others:** You are not the first person writing a thesis (it may not be a good comfort though). Millions of theses have been written before, so maybe you can get hold of some older theses (preferably those that have been graded well. If they won a prize, it is a good indicator). Talk to your fellow students, share your ideas and learn from each other. Offer to proof-read a chapter of their thesis and hope for a reciprocal offer. Check out how peer-reviewed studies are written; you can learn a lot from the existing literature – but it requires you to read and read (but remember: read economically!).

10. **Enjoy the time!** Writing a thesis is a marathon, it requires preparation and a lot of perseverance. It also requires time to rest, putting aside your work, going for a walk, nap, run, swim, dinner, hike, you name it – this will reload your battery and supply you with new ideas. Also, rotate between tasks that require a lot of brain power with tasks that are rather mechanic (e.g., data entry, formatting). Do not fall prey to procrastination, it is the number one enemy. Communicate regularly with your supervisor but remember – in the end it is your thesis and your independent work! You are in the driver seat; you are the boss and project manager of the thesis. Writing a scientific work can also be seen as a privilege: you focus on a key topic for about half a year, and you become an expert about it. After your master studies, you may never have this chance again. So, seize the opportunity and enjoy it. Have lots of fun!

PS:. There are also many other informative and helpful guidelines that surely will contradict the above. Refer for instance to "*Tips and Tricks for Preparing a Scientific Thesis*" by Stephan Dabbert (2008) retrievable at https://projekte.uni-hohenheim.de/i410a/diplom/tipps_tricks_en.pdf. Moreover, the university also offers academic writing aid (https://agrar.uni-hohenheim.de/academic_writing_aid). Finally, please remember: Only a finished thesis is a good thesis. It is quite normal that the final thesis only feels like a "draft study" - after all, you just had six months. For those that publish their thesis later, it will become clearer, because quite some additional work is usually needed to make a thesis publishable. Also remember: a thesis should be completed within 6 months of time. Everything beyond that is free labor (or slave labor) supplied to your university. Of course, it is a different story if your institute pays you, for instance, in the form of a research assistantship position.

Disclaimer: This guide is not necessarily written in the most eloquent and formal scientific style (We hope you can do better!). Put we hope it brought across the main principles