# Guideline for the preparation of scientific papers

[Bachelor's thesis/Master's thesis/Student research project/Seminar paper] [First and last name | Matriculation number] [Course of studies]



TECHNISCHE UNIVERSITÄT DARMSTADT

TECHNOLOGY& INNOVATION MANAGEMENT

Prof. Dr. Alexander Kock Fachgebiet Betriebswirtschaftslehre | Technologie- und Innovationsmanagement Fachbereich Rechts- und Wirtschaftswissenschaften Technische Universität Darmstadt Hochschulstraße 1 64289 Darmstadt

#### Abstract

Preparing scientific papers is difficult. Especially in the beginning, you must get used to the formal requirements and rules. Simple guidelines will make it easier for you to work in a scientifically rigorous manner and write a compelling manuscript. This guide aims to provide you with these rules and requirements in a well-structured way. The guideline, therefore, addresses various aspects of scientific work. In addition to the basic procedure, this guide discusses and explains content and formal aspects. Studying it thoroughly will enable you to start writing a scientific paper successfully. You will get an impression of the department's expectations.

The abstract should give a precise overview of the work on 3/4 to a maximum of one page and should contain the following:

- Objective and research question
- Methodology/procedure
- Results and implications

The abstract intends to quickly inform readers who want to find out whether the content of the work is of interest to them. It is written in the language of the paper (German for a German paper, English for an English paper, not both). An abstract is not an introduction but a short summary. You should not use any references in the abstract unless it is absolutely necessary (e.g., when your own study is a replication of another study). Then, you need to include the whole reference because an abstract needs to stand on its own.

#### Table of contents

Abstract	1
Table of contents	I
List of Figures	II
List of Tables	
List of Abbreviations	IV
1 Introduction	1
2 Procedure	2
2.1 Organizational procedure	2
2.2 Topic identification and research question	2
2.3 Literature	3
2.3.1 Criteria for the evaluation of literature	4
2.3.2 Literature research	4
2.3.3 Literature administration	6
2.4 Creation of a manuscript	6
3 Content requirements	7
4 Formal requirements	10
4.1 Layout and scope	10
4.2 Structure	10
4.3 Style of writing	11
4.4 Citation	12
4.5 Tables and figures	16
4.6 Writing aids and software	
5 Summary	20
List of references	V
Appendix	VII
Thesis Statement pursuant to § 22 paragraph 7 of APB TU Darmstadt	VII

### List of Figures

Figure	1: General quality criteria for scientific work (own illustration based on Hein (2016)) $\dots$ 8
Figure	2: Exemplary application of a meaningful citation as footnote and in the flow text
	(source: own illustration)15
Figure	3: Exemplary depiction of a hypothesis model (own depiction based on Kaufmann et
	al., 2020, S. 433)

#### List of Tables

Table 1: Suggestions for the identification of a relevant research question (source: own
illustration)3
Table 2: Overview of citation in footnote and text flow (source: own illustration)14
Table 3: Documentation of source types in list of references (source: own illustration)
Table 4: Exemplary tabulated summary of literature sources (source: own illustration)17

#### List of Abbreviations

- APA American Psychological Association
- VHB German Association of University Teachers of Business Administration
- ULB Darmstadt University and State Library

#### 1 Introduction

This guideline provides an overview of the formal and content-related requirements for writing seminar papers, student research projects, and bachelor's and master's theses at TU Darmstadt. The following chapters explain the obligatory standards and recommendations for scientific work and writing, organizational hints, as well as content-related and formal requirements.

The introduction, as the first section of a paper, gives an overview of the paper. Most importantly, it should argue for the relevance of the research. Therefore, it should address the following points in particular:

- Justification of the topic: Why is the topic so relevant that a paper should be written about it? (Motivation from a scientific and practical perspective)
- Point out the research gap to which this work contributes and explain its relevance (research gaps are questions that are scientifically and/or practically relevant and at the same time have not yet been sufficiently researched: A highly relevant but already well-understood problem is no more a research gap than a question that has never been studied and has no relevance).
- Aim of the work or investigation (explicit formulation of the research question(s)).
- Optional: Overview of the structure of the paper and argumentation sequence (potentially use figure). Ideally, the introduction also summarizes the paper's most important results and contributions.

#### 2 Procedure

This chapter provides essential information on the process of writing a scientific paper, as well as some tips on how to get started. With the help of this chapter, you will be able to prepare yourself for the writing process.

#### 2.1 Organizational procedure

In a personal meeting, we will concretize your topic together with you and discuss the individual schedule for the work. The registration of the thesis takes place via your responsible study office. This is the start of the official processing period, which you can find in your examination regulations. You will have to work on your thesis on your own. If you have any questions, please do not hesitate to contact your supervisor.

The submission of the thesis is subject to the regulations of your respective department. Please find out in advance which regulations apply to you. Seminar papers and theses are submitted electronically to the department. The submission of additional materials, such as computer code, calculations, or literature, will be discussed individually with your supervisor.

#### 2.2 Topic identification and research question

We expect theses to strive for scientific contributions. A good research question is the most important step to achieve this and is usually part of a more general research topic. Many authors come across their topic out of interest or are made aware of an exciting topic by the person supervising them. An essential part of a scientific project is delineating and narrowing down a topic clearly and finding appropriate and manageable research questions within that topic for the project framework (Samac et al., 2011, pp. 46 f.).

The research question is the basis for the structure and argumentation of your scientific paper. Therefore, choosing a good research question is key to writing a good paper. The research question must be relevant (contributes to advancing science and/or practice) and fill a theoretical gap (has not been answered before). Throughout your paper, the research question serves as a guideline to structure your arguments. Each paragraph you write should contribute to problematizing the research question (in the beginning) or answering it (throughout the paper). Depending on your topic, finding a good research question is part of the evaluation. Below are some suggestions that can assist you in narrowing down the research question.

Table 1: Suggestions for the identification of a relevant research question (source: own illustration)

Finding a question				
Strengths	Start from your own strengths (prior knowledge). Think twice before entering a completely new field.			
Inspiration	Look for ideas in the world, not just in journals. Read "quality newspapers" and (economics) journals.			
Focus	Do not try to solve all the problems of the world at the same time but look for detail problems.			
Depth	Focus on one question to fully answer it rather than trying to solve multiple ones.			
Relevance	Talk and discuss with practitioners in the field you are potentially interested in.			
Discussion	Talk to scientists. They do not necessarily have to work in your field.			

Create a time/project plan for yourself. Write everything down and organize your notes in the most precise possible way so that you can find relevant notes again later. As a first step, try to narrow down the research question as much as possible (see Table 1). Try to identify "core people" or "core institutions" in your field. Who is most frequently cited? Look for literature reviews in well-known journals to get an overview of research gaps. Specify your question by formulating assumptions (hypotheses) that can be confirmed or disproved. Do not try to find the one true and correct view but develop different views and approaches. Try to get to the core of each view through abstraction. Read different articles and try to explain your problem to others. Which (counter)arguments occur most often? Always take notes. Try to capture the research question in writing repeatedly. Short abstracts (50 - 150 words) are an excellent way to do this, but also reformulations of the original research question.

In many cases, your initial research question might change in the writing process, either because you gained new insights from existing literature or because of your empirical data. Adapting and refining your research question in the writing process is a normal process, and we encourage it. However, you should discuss the changes with your supervisor.

#### 2.3 Literature

Scientific literature is a central component of the theoretical development of the work. Statements in scientific work must meet the requirement of verification. This means that every literal statement (direct quotation) and every statement taken over in meaning from others (indirect quotation) must be identified by an appropriate reference. First, some main criteria are discussed, which every used source should fulfill. Then the different types of literature are compared. Finally, sections on finding and managing the proper literature follow.

#### 2.3.1 Criteria for the evaluation of literature

**Credibility:** Statements from the literature should not be presented without reflection. Contributions can contain tested (proven hypotheses) and opinions, evaluations, and newly established theses. The relevance of these statements should be well documented. Assessing the relevance of contributions correctly varies from case to case. If a statement is repeated often (and by recognized scientists), it is more credible than a single finding by unknown persons. However, the latter can also mean that it is a new finding, which may be correct despite the lack of further evidence or confirmation. A precise examination is necessary in such cases. Otherwise, it is quoted with the restriction that the quality of the source is uncertain. **Recency:** Especially when empirical material is referenced, for example, population figures, the most recent available data should be used. Likewise, in the case of theoretically oriented literature, attention should be paid to recency. Nevertheless, depending on the topic, it is recommended to read older original articles to better understand the topic's development and identify the seminal papers.

#### 2.3.2 Literature research

Searching for and identifying relevant literature for your topic is essential for writing a good thesis. Therefore, it is not only necessary to judge the content-fit, but also the quality of the work.

To find the best literature for your academic paper, it is necessary to know the essential tools of literature research. There are different types of research, and one of your tasks is to discover and develop your personal approach. In the following, we will introduce you to the procedures of researching on the Internet and then to different search engines.

Make a list of keywords related to your topic. You can combine these to find relevant literature in search engines and exclude articles irrelevant to your work. Also, expand this list during the writing process. Pay attention to the references provided in the sources you have already found. If you find thought processes relevant to your work, use the author's references to get more information and deepen your research.

Good research requires diverse sources through which your research question can be viewed from different perspectives. Therefore, use various of the locations for scientific sources given here. To ensure smooth access, be logged into the VPN of the TU Darmstadt during your research (HRZ, n.d.). Our department recommends Web of Science and Google Scholar for

in-depth research and identification of sources. EBSCO Host and TUfind then often provide full-text access to these publications.

**Web of Science** is a paid service that you can use free of charge as a student of TU Darmstadt. A significant advantage of this database is the possibility of performing systematic searches and filtering by important criteria such as keywords, publication date, journal, or even number of citations. In addition, you can view backward citations. Here you can see how often and in which articles your searched material has been cited and which references the material uses. This allows you to further deepen your research (Thomson Reuter, n.d.).

As one of the most popular search engines, **Google** offers the possibility to find internet articles and websites relevant to your work. **Google Scholar** is Google's scientific tool and allows for quick searches. The results must be evaluated critically, as the search engine applies few filters of its own and suggests a portfolio of good and bad sources. Google Scholar has links to a wide range of publishers and search engines.

**TUfind**, the search portal of the Darmstadt University and State Library (hereafter ULB), shows both digital materials and materials available in the ULB (ULB, n.d.a). Take advantage, for example, of the TU Darmstadt's cooperation with the Springer Verlag, Tyler & Francis, and the publishers of the DEAL consortium (Springer/Nature, Wiley, Elsevier). As a TU Darmstadt student, you can access many Springer Verlag books if you are logged into the VPN and use the copy online or visit the Springerlink homepage (Springer, n.d.). Keep in mind that you can also find books not available online in the library. You can research materials onsite, check out materials, and order materials not available through interlibrary loans. Even acquisition requests are possible if the material is not otherwise available.

**EBSCO Host** is a paid service that you can use as a student at the TU Darmstadt. EBSCO Host combines various databases you can flexibly choose for your research (EBSCO, 2016).

Selecting suitable journals as sources can be complicated. The German Association of University Teachers of Business Administration (VHB) provides the **VHB-Rating 2024**, a ranking that can be used to assess the reputation of business administration journals. Use this ranking to find especially high-quality journals and ensure they meet the scientific standard of your work (VHB, 2024a). Many relevant journals in technology and innovation management can be found in the TIE sub-ranking of the VHB for Technology, Innovation, and Entrepreneurship (VHB, 2024b). Note, however, that rankings refer to the journal's reputation as a whole and not necessarily to each article. Thus, even highly-ranked journals sometimes publish lower-quality articles, and conversely, excellent articles may be published in less highly-ranked journals. The decision about the quality of an article is ultimately up to your judgement. However, rankings can provide a good orientation, especially for inexperienced researchers.

Read journals on your topic and other management topics when you start your research. Reading scholarly articles both on your chosen topic and on other current topics will help you learn not only the state of the science but also the linguistic and structural conventions. We do not recommend relying solely on AI-based research assistants to scout for literature, as they are often unable to judge the quality of a paper and are likely to omit important sources.

#### 2.3.3 Literature administration

As soon as you have a certain number of sources, it is advisable to manage them with a literature administration program. For this purpose, there are some programs available. Citavi is available free of charge for you as a student of the TU Darmstadt (ULB, n.d.b). Other programs are generally available free of charge, like Zotero or Mendeley (ULB, n.d.c).

The basic functionality of these programs is identical. You can import citations from Web of Science, Google Scholar, TUfind, and other search engines and create individual literature databases. By integrating PDFs, images, eBooks, and web pages, you can manage and categorize them directly. In addition, all programs allow the *cite while you write* function, which lets you insert citations directly into your scientific work. Note that Citavi is only available for Windows, while Mendeley and Zotero are browser plugins that do not depend on the operating system. Consistent use of a literature administration program ensures that all sources cited in the paper (and only these!) are listed wholly and consistently in the reference list.

#### 2.4 Creation of a manuscript

Structure your thoughts by following an outline. It is helpful to insert literature references into the manuscript in the correct format right from the start. A literature administration program is best suited for this.

At each stage of creation, the manuscript should be read through as often as possible. If a new piece of text has just been written, it should be reread after some time. Shortenings and deletions are almost always an enhancement to any manuscript. Repetitions make a manuscript longer but not better. Texts should be read aloud to check expression and style. In addition, it is helpful to discuss bullet points and essential lines of thought with fellow students and ask for suggestions. Since authors have internalized their text after a certain time, it is sometimes challenging to look for systematic or logical errors. Therefore, others should proofread the text several times.

#### 3 Content requirements

This chapter explains the content requirements for a scientific thesis. First, we discuss the objectives of the thesis and the required quality criteria. Based on this, we present the criterion of originality of a thesis. A scientific paper in your studies should demonstrate the ability to work independently in a scientific manner. The goal of the work is reached if it leads the reader in clear and unambiguous steps to new knowledge. In doing so, it should become clear,

- what has been done,
- why it was done,
- how it was done,
- what results have been achieved and
- how these results can be interpreted and used.

When writing the paper, the four general quality criteria of scientific work must be observed in particular: Objectivity, reliability, validity, and originality. Objectivity is the extent to which a research result/statement is independent of scientists in its execution, evaluation, and interpretation. Different results may be achieved in the execution or the evaluation and interpretation. Reliability indicates the consistency of a measurement method. A test is reliable if it produces the same result when repeated under the same conditions and on the same subjects. Validity is the most important quality criterion because it indicates the degree of accuracy with which an investigation captures what it is supposed to capture (Morse et al., 2002, p. 14 f.). The principle of validity and reliability is illustrated in Figure 1.

Originality describes the intellectual contribution of the author. Generally, this should take one of the following two forms. The most common form of this personal contribution is the systematic collection and condensation of all essential contributions to a specific scientific question. Thus, the first important step is to collect all topic-related publications as exhaustively as possible. Here, the goal is not to compile new facts but rather to improve, simplify and, above all, systematize the presentation of facts that are already known but have never been summarized in a single paper. The systematization of comparison and differentiation of the different theories and investigations is decisive for qualitatively good work. This can be limited to the elaboration of differences and commonalities. However, it usually requires the elaboration of evaluation or selection criteria regarding the applicability of the individual papers to specific problems.



Figure 1: General quality criteria for scientific work (own illustration based on Hein (2016))

The transfer or adaptation of a theory or research methodology to an issue or target group not previously considered in this way forms the basis for another class of scientific work. Here the goals are, on the one hand, the discussion of the transferability of the given theory or methodology to the chosen question or target group and, on the other hand, the new findings resulting from this transfer. In this approach, apart from providing the necessary general overview of the state of research, the completeness of the literature presentation is not generally to be striven for. On the contrary, the well-founded restriction to the areas necessary for the transfer is usually much better. Both in the discussion of transferability and the interpretation of the results obtained, the specific characteristics of the chosen research question or target group are to be presented in the greatest possible precision and detail and utilized accordingly. In the deliberate restriction to a minimal section, the work gains its quality through the depth of the investigation and discussion.

Good scientific papers are characterized by the fact that not just any result is postulated but that the entire development of this result is disclosed in a comprehensible and testable manner. All assumptions, considerations, and arguments must be explicitly derived, justified, and discussed. Anything that cannot be proven, for example, by publication in a scientific journal, must first be explicitly derived and plausibly justified.

Each chain of argumentation must be clearly structured, comparable to a mathematical proof: thesis, premises, stepwise execution of the evidence. Especially within the description of the elaboration of new knowledge, logic (not time) should determine the sequence. If argument B has to be based on argument A, argument A should be placed before argument B in the text. It is to be avoided that readers have to turn back pages because they understand what was written before only belatedly due to subsequent arguments.

In this context, you should structure the text reasonably using paragraphs. In principle, only one idea (e.g., an argument) should be developed in a paragraph. The main statements should always be placed at the beginning of a paragraph since readers can classify all subsequent secondary statements. The detailed structure of the individual paragraphs should approximately be the following:

- Identify main statement(s).
- Explain and discuss main statements and support them with secondary statements.
- Draw conclusions from the argument (which leads to the next step).

#### 4 Formal requirements

This chapter describes the formal criteria for a scientific paper. In evaluating a scientific paper, formal criteria refer to the layout, the scope, the structure, the citation, the linguistic design, and the bibliography (Limburg & Otten, 2010, pp. 16 ff.).

#### 4.1 Layout and scope

The thesis must be written in 11 pt. Arial or 12 pt. Times New Roman, with 1½ - line spacing and justified text (footnotes in 10 pt. font size and single line spacing). No hyphenation is used in justified text. Page margins are: top: 3.0 cm, bottom: 2.5 cm, left: 3.0 cm, right: 2.0 cm. The page numbering with Arabic numbers starts with the first text page and runs to the paper's last page. Accompanying texts and indexes of the text are counted through with Roman numbers, which, however, are written out only after the title page. The Roman or Arabic numbers must be placed in a clearly visible position. Each submitted paper must have a title page with fixed content.

The text of a thesis should be 60-80 pages for a master's thesis or 40-60 pages for a bachelor's thesis, excluding the title page, abstract, list of contents, list of abbreviations, and list of figures as well as the appendix and reference list. For seminar papers, the specifications of the seminar supervisor at the kickoff event apply.

Adherence to these page numbers is an integral part of the assignment. The limitation requires distinguishing important from unimportant and using precise representations instead of cumbersome paraphrases. Exceeding the page count in specific cases must be discussed in advance with the supervising person.

#### 4.2 Structure

The logical order of the main ideas and explanatory steps determines the structure of the paper. The entire text should be coherent and complete in terms of content and follow a red thread. Logical transitions should be created between the individual chapters to lead to the objective of the next part. In general, each paragraph you write should contribute (directly or indirectly) to answering your research question.

It is advisable to subordinate your thought process to your outline concept during the writing process. This concept can be based on only a few keywords in the first days of collecting material. In the dynamic work process, the first rough division will change. The more differentiated the (preliminary) outline is, the easier it is to prepare the manuscript. Since each bullet point comprises only a few individual thoughts and problems, the formulation is more manageable than complex problem packages.

The work must be structured numerically. The outline may be subdivided up to a maximum of three levels. Chapters may be subdivided into two or more subchapters. A subchapter must cover at least <sup>3</sup>/<sub>4</sub> of a page. Furthermore, the first paragraph of a chapter that is further subdivided serves to inform the reader about the structure of the following chapter. No content-related information is conveyed. This requires a separate subchapter. The table of contents reflects the complete structure of the written work. It must show all components of the paper that carry a page number. In addition, all accompanying text, the appendix, and all indexes must also be included in the table of contents. All headings and section titles in the Table of Contents and the paper must be identical. The text must not have any numbered bullet points that are not listed in the table of contents.

#### 4.3 Style of writing

Although scientific texts primarily serve to present and critically discuss a factual problem, the linguistic elaboration must be unambiguous. If thought processes are presented unclearly, there is room for interpretation, which allows for errors. Many papers investigate topics that are complicated to understand and should use a writing style that contributes to the understanding of the contents.

This also applies to maintaining a consistent style throughout the paper. Therefore, seminar papers written in teams present a particular challenge. Consult well with your team and revise each other's pieces of text to keep the style of the paper consistent.

When writing, be sure to guide the readers through the text. If they have to look for necessary explanations in footnotes, the paper is incomplete. The following stylistic elements occur frequently and should be avoided:

- **Professional terms:** They are used in every science, but their use must be carefully adapted to the work's aim and audience.
- Foreign words and fashion words: Although these can attract the reader's attention, they can make the text incomprehensible if misused. Professional terms and unique vocabulary are suitable to make facts clear in a precise form in individual cases. When introducing a new term, what is understood by this term should be explicitly defined in the work context.
- **Slang:** Slang phrases are no means of stylistic simplification. They have an unobjective effect.
- Phrase-like paraphrases: These should be avoided just as important as the attempt to give oneself courage by using reinforcing adverbs or superlatives instead of convincing arguments: "only correct model," "incredibly wrong approach," or "most optimal alternative." Tautological statements should also be avoided in all cases.

Adverbs such as "of course" or "self-evident" are forbidden in any scientific paper, "probably", "almost", "somehow", "to some extent" are restrictive words that give the impression of the uncertainty of content. A gap in thought should not be filled with the famous glue word "now", a sentence transition should not be worsened with "by the way". The words "one" or "you" should not appear in papers.

• Verb tenses: Avoid conditional tenses because they limit a statement's clarity and are an indication of assumptions. Base your statements with arguments or discuss further reasons that influence the statement's validity. In addition, you should use the past tense only in exceptional cases. Preferably use the present tense and avoid the present continuous tense. Also, avoid the passive voice and use as much active voice as possible.

#### Further:

- **Spelling, grammar, punctuation:** These must comply with the regulations of the current edition of "The Shorter English Dictionary" or "Webster's Collegiate Dictionary". Nested sentences should be avoided.
- **Paragraphs:** Paragraphs are stylistic means that make it easier for readers to keep their orientation in your text. They separate individual arguments or thoughts from each other and signal something new. Both extremes, paragraphs after each sentence and no paragraphs at all, show a lack of structure.
- Topic-specific abbreviations: Abbreviations should be used sparingly; however, they can enhance reading flow. Topic-specific or subject-specific abbreviations must be defined the first time they are used and included in the alphabetically sorted list of abbreviations. Abbreviations and acronyms listed in the DUDEN as generally understandable (abbreviations such as USA) do not have to be defined and included in the list of abbreviations. It is inadmissible to form own abbreviations for convenience (e.g., 'Volksw.' or 'prod.-fct.'). The abbreviations used in figures must be explained directly in a legend (Hagenloch, 2010, S. 20).

#### 4.4 Citation

It is a necessity of scientific writing to give exact information about the origin of all facts and not independently developed thoughts with explicit reference to the source. When in doubt, the author should include a citation. Resort to the original texts whenever possible.

The opinions of other authors can be quoted either literally or indirectly. Literal quotations should be used very sparingly. They are only used if an author has formulated a matter

remarkably concisely. Literal quotes are placed in quotation marks; the citation note begins with the last name of the original document without a preface. Care should be taken to ensure that the quotation is the same as the source. Any changes made to the original text should be specifically noted. In particular, omissions are to be indicated by three consecutive dots, by three dots in brackets if more than one sentence is omitted. Own additions within a quoted text, such as exclamation marks and verbs added to complete a sentence, are inserted in square brackets. Notes explaining a word used in the literal quotation are inserted in round brackets with the addition 'Editor's note'. Quotations in a citation are marked with an apostrophe at the beginning and the end. Generally, a quote should not exceed two to three sentences. If longer quotations seem unavoidable, they should be indented in the text and written with single-line spacing.

Table 2 gives an overview of how you can cite references, either using a footnote or as an intext citation. Figure 2 shows both citations again in the text. When citing directly in the text, the sentence closes with the source citation in brackets and is terminated by a dot after the brackets.

If the original work is not accessible and all efforts to obtain it have been exhausted, citation according to secondary literature is permitted as an exception (e.g., unpublished dissertation writings or ancient monographs no longer in print). In this case, the original reference is given first and followed by the suffix 'quoted from'.

Table 2: Overview of citation in footnote and in-text citation (source: own illustration)

Citation in footnote	In-text citation			
(marked in the text by superscript Arabic numbers)	(in parentheses in the text)			
Name(s) of author(s)	Name(s) of author(s)			
• Year of publication, set in brackets	Year of publication			
• Page(s) on which the citation can be	• Page(s) on which the citation can be			
found in the source (the page reference	found in the source (the page reference			
is not necessary for citations from the Internet).	is not necessary for citations from the Internet).			
• Start with capitalization, end with a punctuation mark (.)	Start with capitalization			
Only use one footnote for several				
citations referring to the same				
sentence.				
Basic quote:				
Cf. Hauschildt et al. (2016), p. 17.	(Hauschildt et al., 2016, p. 17)			
Citation In-text :				
Hauschildt et al. (2016, p. 17) define innovation as				
If an idea in a cited work is taken over two or	more pages:			
Hauschildt (2016), pp. 14-17 (Hauschildt, 2016, pp. 14-17)				
If several publications with the <b>same year of publication</b> are used by <b>one author</b> , they are distinguished alphabetically according to the year.				
Hauschildt (2016a), p. 21 Hauschildt (2016b), p. 145	(Hauschildt, 2016a, p. 21) (Hauschildt, 2016b, p. 145)			
Two or more authors:				
Gemünden and Walter (1995), p. 72. Gemünden et al. (2005), p. 370.	(Gemünden and Walter, 1995, p. 72) (Gemünden et al., 2005, p. 370)			

Example footnote:

Schumpeter coined the term innovation in his work on the theory of economic development.<sup>1</sup>

<sup>1</sup> Cf. Schumpeter (1931) as cited in Hauschildt et al. (2016), p. 10; Hagenhoff (2008), p. 13.

Example continuous text:

Schumpeter coined the term innovation in his work on the theory of economic development (Schumpeter, 1931, as cited in Hauschildt et al., 2016, p. 10; Hagenhoff, 2008, p. 13).

## Figure 2: Exemplary application of a citation as a footnote and an in-text citation (source: own illustration)

The reference list is an obligatory part of every scientific paper. We basically follow the APA citation style (APA, n.d.). The reference list is the complete compilation of all literary materials processed in the work, which have been verifiably considered in some form. The reference list must be arranged alphabetically by author names. In the case of multiple works by the same author, the bibliography shall be arranged by year of publication, beginning with the oldest work. In the case of several works by one author from one year, lowercase letters starting with "a" are introduced after the year number (e.g., 1980a, 1980b). The order of a, b, c, etc., follows the order of the source references. If an author has written a work in collaboration with several authors, this work is to be included in the bibliography following their individual publications. The works with one co-author are cited first in alphabetical and chronological order, then those with two co-authors. Table 3 gives you an overview of the primary source types and how they should be listed in the list of references.

Source type	Systematics	Example
Books (with author)	Name, first name(s) abbreviated, name, first name(s) abbreviated & name, first name(s) abbreviated (year(s) of publication). <i>Title</i> . Place(s) of publication: Publisher(s), volume, edition.	Hauschildt, J., Salomo, S., Schultz, C & Kock, A. (2016). <i>Innovationsmanagement</i> . München: Vahlen, 6 <sup>th</sup> edition.
Books (without author)		N.N. (n. d.). <i>Mit dem Literaturverzeichnis auf Du und Du: Neue Tipps und Kniffe bei der Anlage eines</i> Literaturverzeichnisses. Regensburg: Selbstverlag.
Journal article	Name, first name(s) abbreviated (year of publication). Title of the article. <i>Name of the journal</i> , year (or Vol.), issue number/volume, first and last page.	Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organizations - a state- of-the-science review, prospective commentary, and guiding framework. <i>Journal of Management</i> , 40(5), 1297-1333.
Compilations	Name, first name(s) abbreviated (of the editor) (year(s) of publication). Title. In: name, first name(s) (of the author team or editors with abbreviation("Ed./Eds.")): <i>Title – subtitle</i> . Place(s) of publication: publisher(s), volume, edition, first and last page (column) or § statement and remark or margin number.	Gemünden, H.G., Kock, A. (2009). Bei radikalen Innovationen gelten andere Spielregeln. In: Harland, P. E. & Schwarz-Geschka M. (Eds.): <i>Immer eine Idee Voraus: Wie innovative Unternehmen</i> <i>Kreativität systematisch nutzen</i> . Lichtenberg: Harland Media, 31-51.
Internet source		Evonik. (2011, Jan. 14). <i>Pressemitteilung: Evonik</i> <i>und Boehringer Ingelheim unterzeichnen Vertrag</i> <i>über den Verkauf des Resomer-Geschäfts an Evonik</i> (Report No. 16963). Essen: Evonik Industries AG. Accesed to: http://corporate.evonik.de/de/presse/suche/pages/ne ws-details.aspx?newsid=16963 (last accessed on: 17.06.2015).

#### Table 3: Documentation of source types in list of references (source: own illustration)

#### 4.5 Tables and figures

We encourage augmenting your argumentation with tables and figures. However, they should not be overused and must offer added value compared to the pure explanations in the continuous text. They must never be used for distraction, obfuscation, or placeholders. An illustration should stand independently and be comprehensible to expert readers without studying the preceding page(s). In any case, included figures and tables must also be referred to in the main text. Abbreviations used in illustrations must be explained directly in a legend. In the case of scientific illustrations, attention must be paid to the correct axis labeling and units used (e.g., "costs in euros", "time in hours", etc.). In addition, illustrations should be designed in a uniform and readable style. In general, illustrations should always be created by the author.

The citation should then be made with "based on". Care should be taken to ensure that the illustrations are high-contrast and easy to read, even in black and white.

The table caption is placed above the table to indicate the content precisely. In addition, the table is to be left-aligned or centered. To maintain spacing from the text that follows, tables and figures are followed by a blank line (Table 4).

Table 4: Exemplary tabulated summary of literature sources (source: own illustration)

Research question	Method	Year	Reference
How can lead users be identified by their social network position?	quantitative	2016	Kratzer et al.
How do the social needs of creative individuals affect the idea development process over time?	qualitative	2017	Perry-Smith & Mannucci
How does knowledge of individuals and their social network affect exploratory behavior?	quantitative	2014	Wang et al.

In contrast to the table, the figure caption is below the figure and is also to be left-aligned or centered (Figure 3). Tables and figures are numbered consecutively (but separately). References to tables and figures should be given in brackets after the word "source" after the title. If the table is based on the author's own data or if a figure is based on the author's own depiction, the source should be indicated as follows: "source: own illustration".

Only if tables or figures are disproportionately large compared to the text and their importance for the paper it is recommended to add them as an appendix to the paper. Otherwise, they should appear in the running text.



Figure 3: Exemplary depiction of a hypothesis model (own depiction based on Kaufmann et al., 2020, p. 433)

The List of Figures and Tables contains all figures and tables used in the paper with the corresponding page numbers. This list ensures an overview of the tables and figures used in the paper. A list of figures and tables is obligatory for three or more entries.

#### 4.6 Writing aids and software

In recent years, several tools and programs have emerged to support the writing process. They can support you in writing and editing, organizing and structuring, as well as rewording and paraphrasing the contents of your paper.

We highly encourage the use of software to check your spelling and grammar. Most writing software (e.g., Microsoft Word) has built-in tools to check your spelling and grammar, but the usage of external tools or plug-ins can further improve it and is also allowed. We expect a paper free from spelling errors and grammatical errors as they can distract the reader from your contents and argumentation.

Two types of tools can help you in organize and structure the contents of your paper. The first type are "passive" tools that encourage your creativity; for example, mind-mapping tools can help you in clustering your thoughts and ideas. However, you can also use analog methods or simple tools like Microsoft Word to structure your thoughts in the beginning. The advantage of those approaches is the quick adaptability of your argumentation structure and comparison of alternatives. The second type are "active" tools, mainly building on generative AI, for example, ChatGPT. Such tools can propose paper structures and argumentation paths based on the information you provide them with. They can serve as a starting point, providing you with inspiration and acting as a discussant. However, they will often produce very generic results and refrain from specific statements that may be debatable. Yet, specificity is required in scientific work to achieve relevant contributions.

Active tools can also be used to paraphrase or reword the contents of your paper. While this usage is allowed, they must not be used to generate content, and we highly encourage the critical reflection of results. In particular, tools assisted by generative AI can sometimes produce wrong results or an argumentation deviating from the rest of your paper. The latter is particularly important as it is often not directly obvious. Such tools can only provide results within the information you provide them. Simply copying the results from generative AI will often not fit the rest of your paper and result in an incoherent argumentation. In particular, such tools should never be used to extract information from existing literature. They have limited access to existing papers, are not capable of judging papers' quality and/or fit to your topic, will often neglect primary sources, and do not consider the context of statements (e.g.,

hypothesis vs. result). Further, using such tools for literature reviews will often result in plagiarism and, thus, fail the thesis.

In summary, we encourage the use of "passive" aids and software but discourage "active" aids like ChatGPT and similar as they are not (yet) suited for scientific writing. They can support you by serving as inspiration and/or discussant, but results must always be critically reflected, and the tools must never be used to actively generate content for your thesis.

#### 5 Summary

This guide aims to explain the content-related and formal requirements for a scientific paper. For this purpose, the general procedure from the preparation of the exposé to the writing of the manuscript is explained. Furthermore, basic knowledge in dealing with technical literature will be imparted. Finally, the content and formal requirements of the subject area will be pointed out. If you have further questions, you can contact your supervisor or use the referenced literature.

The final chapter of the thesis contains a conclusion of the written work. For this purpose, the question from the introduction can be taken up again exemplarily, and the developed suggestions in this regard can be presented and discussed. The limitations, the contributions of the work for research and practice, and an outlook on further research and the need for action are given in the discussion.

#### List of references

- APA, American Psychological Association. (n.d.). Quick Answers References. Access to: http://www.apastyle.org/learn/quick-guide-on-references.aspx (last accessed on: 11.12.2020).
- Disterer, G. (2006). *Studienarbeiten schreiben: Diplom-, Seminar-und Hausarbeiten in den Wirtschaftswissenschaften*. Berlin, Heidelberg, New York, Springer, 3. Auflage.
- EBSCO Industries. (2016). *EBSCOhost Research Database*. Access to: https://www.ebscohost.com/ (last accessed on: 11.12.2020).

Esselborn-Krumbiegel, H. (2012). Von der Idee zum Text. UTB GmbH.

- Hagenloch, T. (2010). *Die Seminar-und Bachelorarbeit im Studium der Wirtschaftswissenschaften: Ein kompakter Ratgeber*. Burgheim, hBoD–Books on Demand.
- Hein, T. (2016). Gütekriterien Objektivität Reliabilität Validität. Kürnach: Statistik & Beratung. Access to: http://www.statistik-und-beratung.de/2016/03/2552 (last accessed on: 25.07.2016).
- HRZ, Hochschulrechenzentrum TU Darmstadt. (o.J.). Cisco AnyConnect VPN-Client. Access to: https://www.hrz.tudarmstadt.de/netz/netzzugang\_internet/netz\_datennetz\_internet\_vpn\_1/index.de.jsp (last accessed on: 11.12.2020).
- Kaufmann, C.; Kock, A. & Gemünden, H. G. (2020). Emerging strategy recognition in agile portfolios. *International Journal of Project Management* 38 (7), 429-440.
- Kratzer, J.; Lettl, C.; Franke, N. & Gloor, P. (2016). The social network position of lead users. *The Journal of Product Innovation Management 33 (2),* 201-216.
- Limburg, A. & Otten, S. (2011). Schreiben in den Wirtschaftswissenschaften. Vol. 3540. UTB.
- Morse, J. M., Barret, M., Mayan, M., Olson, K. & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International journal of qualitative methods* 1 (2), 13-22.
- Perry-Smith, Jill E.; Mannucci, Pier Vittorio (2017): From creativity to innovation: The social network drivers of the four phases of the idea journey. In *Academy of Management Review* 42 (1), 53–79.

- Samac, K., Prenner, M. & Schwetz, H. (2011). *Die Bachelorarbeit an Universität und Fachhochschule: ein Lehr-und Lernbuch zur Gestaltung wissenschaftlicher Arbeiten*. Wien, UTB, 2. Auflage.
- Springer International Publishing AG. (n.d.). Springer Link. Access to: http://link.springer.com/ (last accessed on: 11.012.2020).
- Suesserott, B. E. & Bitschnau, K. (2010). *Themenfindung und Forschungsfragen.* In: Hug, Theo & Niedermair, K. (Hrsg.). *Wissenschaftliches Arbeiten: Handreichung.* Innsbruck, STUDIA, 2. Auflage.
- TU Darmstadt (o.J.): *Willkommen beim digitalen Archiv für studentische Abschlussarbeiten.* Online available at: https://tubama.ulb.tu-darmstadt.de/ (last accessed on: 11.12.2020).
- Thomson Reuters. (n.d.). Web of Science. Access to: http://apps.webofknowledge.com/WOS\_GeneralSearch\_input.do?product=WOS&searc h\_mode=GeneralSearch&SID=Z2QhPpneGhvzqL78CAO&preferencesSaved= (last accessed on: 11.12.2020).
- ULB, Universitäts- und Landesbibliothek Darmstadt. (n.d.a). TUfind das Suchportal der ULB Darmstadt. Access to: http://www.ulb.tu-darmstadt.de (last accessed on: 11.12.2020).
- ULB, Universitäts- und Landesbibliothek Darmstadt. (n.d.c). *Literaturverwaltungsprogramme*. Access to: http://www.ulb.tudarmstadt.de/service/literaturverwaltung\_start/vergleich\_litverw/litv\_uebersicht.de.jsp (last accessed on: 11.12.2020).
- VHB, Verband der Hochschullehrer für Betriebswirtschaft e.V. (2024a). VHB Publication Media Rating 2024. Access to: https://vhbonline.org/en/service/vhb-rating-2024/#:~:text=The%20VHB%20Rating%202024%20consists,– %20WK)%20of%20the%20VHB (last accessed on: 29.04.2024).
- VHB, Verband der Hochschullehrer f
  ür Betriebswirtschaft e.V. (2024b). VHB Publication Media Rating 2024: Area rating Technology, Innovation and Entrepreneurship. Access to: https://vhbonline.org/fileadmin/user\_upload/VHB\_Rating\_2024\_Area\_rating\_TIE.pdf (last accessed on: 29.04.2024).
- Wang, Chunlei; Rodan, Simon; Fruin, Mark; Xu, Xiaoyan (2014): Knowledge networks, collaboration vetworks, and exploratory innovation. In *Academy of Management Journal* 57 (2), 484–514.

#### Appendix

Please include the Thesis Statement on the second page of your work.

#### Thesis Statement pursuant to § 22 paragraph 7 of APB TU Darmstadt

I herewith formally declare that I, [first name last name], have written the submitted thesis independently pursuant to § 22 paragraph 7 of APB TU Darmstadt without any outside support and using only the quoted literature and other sources. I did not use any outside support except for the quoted literature and other sources mentioned in the paper. I have clearly marked and separately listed in the text the literature used literally or in terms of content and all other sources I used for the preparation of this academic work. This also applies to sources or aids from the Internet.

This thesis has not been handed in or published before in the same or similar form.

I am aware, that in case of an attempt at deception based on plagiarism (§38 Abs. 2 APB), the thesis would be graded with 5,0 and counted as one failed examination attempt. The thesis may only be repeated once.

Darmstadt, June 13, 2024

[First and last name)