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| Applied Research |
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Learning Goals

This **Applied Research** course provides you with the key concepts and methods of applied empirical research. Alongside this, you will gain an in-depth knowledge on how to evaluate the quality, as well as the limitations, of different empirical research approaches. To begin, the essential theoretical foundations of empirical research and the primary process steps of empirical research projects are presented. This allows you to also become sensitized to the relevant ethical and legal challenges. As the course advances in deeper detail, it covers the application of key qualitative and quantitative research methods, discussing each respective method’s primary goals and decision areas, their strengths and weaknesses, and practical recommendations for application. This course provides you with the knowledge to develop an empirical study for an applied problem in your field or professional environment, as well as critically evaluate the quality of the empirical findings and their validity.

# Unit 1 – Fundamentals of Empirical Research

Study Goals

On completion of this unit, you will be able to ...

... evaluate the type and quality of empirical research, as well as concrete empirical research results, using relevant criteria.

... identify appropriate data and research methods to empirically address a specific problem or research question.

... name and critically compare the process steps, as well as the potentials, goals, and limitations of various quantitative and qualitative research methods.

... recognize and consider the underlying ethical and legal issues relevant to conducting empirical research.

... design an empirical study, independently and guided by theory, to adequately address a specific application-oriented research problem.

# 1. Fundamentals of Empirical Research

### Introduction

What do PISA studies, Corona dashboards, and statistics on unemployment figures have in common? They are based on scientific findings. But what exactly is science? How does science differ from everyday activities and which goals does it pursue?

The following unit is intended to provide an overview of these questions and illustrate the relevance of science to practical application. Many inventions of our time would not exist without science. For this reason, it is particularly worthwhile to take a closer look at this term and its background.

## 1.1 Goals and Underlying Approaches of Empirical Research

Science is a complex phenomenon that is difficult to explain in a few sentences. Philosophers have been debating over what characterizes science for many years (Eisend & Kuß, 2017, p. 2).

The philosopher Immanuel Kant (1724–1804) wrote: “Knowledge, as science, must be arranged according to a method. For science is a whole of knowledge as a system and not merely an aggregate of separate cognitions (knowledge). It therefore requires a systematic knowledge, that is, a knowledge formulated according to considered rules” (Jäsche, 1800, p. 216).

In some definitions, science is equated with the search for truth; in others, the focus is on gaining knowledge through rational, understandable, and explanatory methods (Rost, 1966, p. 26).

As a basic principle, science is characterized by the following three aspects (Eisend & Kuß, 2017, pp. 1–3):

* The focus of science is the generation of knowledge.
* Scientific assertions must be substantiated.
* Science is based on a system with an argumentative structure.

### Differentiation between the Terms Science and Everyday Knowledge

There is a distinct difference between science and everyday knowledge. While the focus in both cases is on gaining knowledge, it is respectively accessed in different ways.

People's personal experiences and perceptions form the basis for everyday knowledge. Everyday knowledge helps people orient and adapt themselves more easily in the world. Typical subjects in this context are the weather, diseases, or feelings. Compared to everyday knowledge, science involves assumptions and assertions that are verified before they are presented in the form of universally valid rules. This verification is carried out by means of **methods**. Specific criteria, such as objectivity or intersubjectivity, must be met and will be discussed in greater detail further into the course (Perrez, 1991, pp. 227–230).

The figure below (Kromrey et al., 2016, p. 23) is intended to provide an overview of the differences between science and everyday experience.

Comparison of Scientific Experience and Everyday Experience

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Source: Kromrey et al., 2016, p. 23.

### Functions and Tasks of Science

Science is designed to produce provable results. Among other things, such results can serve as justification for social action. Alongside this, they can also be used as decision-making aids, for example by policymakers (Kromrey et al., 2016, p. 16). Science is intended to contribute to progress.

### The Goals of Science

Science is a fact-based structure that ...

* ... pursues the most objective possible description and classification of phenomena within the real world.
* ... strives to create universally valid rules to explain occurrences and predict categories of occurrences (Kromrey et al., 2016, p. 22).

The epistemic goal of science is illustrated in the figure below (Eisend & Kuß, 2017, p. 14):

The Goals of Science

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Source: Eisend & Kuß, 2017, p. 14.

As indicated in the figure above, the epistemic goal is based on the following epistemological assumptions (Eisend & Kuß, 2017, pp. 13–14):

* *Minimal empiricism*: assertions are obtained and verified using empirical methods.
* *Minimal realism*: in order to speak of truth, the empirical facts should be objectively and correctly represented. All decisions should be factually and methodically based.
* *Logic in the broad sense*: precise definitions, assertions, and arguments are necessary to arrive at a verisimilitude (closeness to the truth).
* *Objectivity and intersubjectivity*: assertions and results must be free from the opinions, attitudes, and values of the observer.
* *Fallibilism and critical stance*: findings should always be critically questioned in order to come closer to the truth by confronting them.

When considering the figure above, the individual assumptions are related to each other as follows (Eisend & Kuß, 2017, p. 14):

* A: Critically questioning results leads to a more intense approach to the truth.
* B: Empirical methods allow a theory to be verified in reality.
* C: Closeness to the truth can only be created through objectivity, in which individual opinions, attitudes, values are eliminated. In addition, methods must be adequately applied and results carefully documented.
* D: Precision is the basis for valid results. Precise definitions are necessary to establish agreement between theoretical presumption and observations.

#### The relationship between empiricism and theory

The relationship between empiricism and theory is a subject of lively discussion in science. Essentially, there are two approaches: One group of scientists classifies empirical work as a path to a theory, while the other considers a theoretical reflection as the basis for empirical work. Accordingly, the groups mentioned here see themselves as empiricists or theorists (Humme, 2015, p. 7).

#### Definition of the term *empiricism*

In empiricism, experiences regarding facts are collected, systematically classified, and applied to a specific subject area. The procedure is documented and is intersubjectively understandable (Brosius et al., 2016, p. 3).

#### Definition of the term *theory*

The term theory generally means that a system is formed based on concepts and definitions, as well as assertions, to classify, explain, and predict knowledge regarding facts in specific subject areas. If the term theory is examined with a scientific attitude, then the formed system is also intersubjectively verifiable and the assertions are methodically obtained and are in an uncontradictory relationship (Kraus, 2022, p. 5).

Both empirical research and theory formulation are necessary cornerstones in gaining knowledge in science. In theory formulation, there are three scientific methods of inference that play an essential role: inductive, deductive, and abductive (Eisend & Kuß, 2017, p. 60).

These practices are explained in the following:

#### Deductive procedure

During deduction, conclusions are drawn from the general to the specific (Döring & Bortz, 2016, p. 35). In the case of a deductive procedure, a theory is first sought that could provide possible answers to a research question or could provide explanatory approaches for the phenomena under investigation. Hypotheses are derived from the theories. They serve as provisional answers to be empirically tested. If a hypothesis is indeed true, the theory is confirmed. If it is not, the hypothesis is discarded and subsequently revised and reexamined as necessary (Wichmann, 2020, 27ff).

Since the deductive procedure can be linked to existing theories that have already been verified, it is more efficient than the inductive procedure described below. The disadvantage, however, is that it is unlikely that completely new perspectives that offer a different perspective on the matter will emerge (Eisend & Kuß, 2017, p. 99).

#### Inductive procedure

During induction, conclusions are drawn from the specific to the general (Döring & Bortz, 2016, p. 35). Knowledge is gained from experience and specific individual observations. The more often something is observed, the more likely it is to be true. This procedure is often used in practice. Individual observations lead to a theory or to the further development of already existing theories. In contrast to the deductive procedure, data collection is the first step and the work of theory formulation follows (Wichmann, 2020, p. 30).

Induction has an advantage over the deductive approach because it is significantly more open. Results are reached based on the respective data or experiences and are therefore not so strongly influenced by previous ideas (Eisend & Kuß, 2017, p. 99). The disadvantage, however, is that theories developed in this way initially appear to be isolated (Eisend & Kuß, 2017, p. 99).

#### Abductive procedure

Abductive reasoning, which has received little attention in literature thus far, should also be noted here for the sake of completeness. Abduction involves inferences from observations in relation to their (presumed) causes (Eisend & Kuß, 2017, p.99). As a further distinction, selective abduction refers to a set of already known hypotheses, while creative abduction allows an entirely new, plausible hypothesis to be developed. In contrast to deductive and inductive logic, the abductive procedure takes underlying meanings, motives, and intentions into account (Wichmann, 2020, p. 31).

The figure below presents an overview of the scientific methods of inference:

Induction, Deduction, and Abduction Summary

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Source: Eisend & Kuß, 2017, p. 99.

#### Empirical testing of theories – the selection of appropriate methods

Quantitative or qualitative methods can be applied to empirically test theories. In principle, a mix of methods is also possible. According to Wichmann (2019, p. 7), the division into quantitative and qualitative approaches arose from the debate, among other things, as to whether the natural and social sciences can use the same methods of obtaining knowledge.

The distinction between quantitative and qualitative research approaches is based on fundamentally different ways of thinking and conceptions of the human being. The figure below illustrates the differences between the two approaches with regard to the conception of the human being:

Comparison of Quantitative and Qualitative Approaches

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Source: Schumann, 2018, p. 148.

Quantitative approaches are based on the natural sciences. They assume that a separate range of methods to study people is not required. The principles – standardized procedures, quantification, frequency and distribution of occurrences, accuracy, delimitation of cause-effect relationships, establishment of universally valid laws, and objectivity, as well as the possibility of controlling conditions – can be applied (Wichmann, 2020, p. 7).

Qualitative approaches assume that humans cannot be studied with the same principles and research methods as applied to natural sciences. Since human beings are not only bodies, but also minds and souls, a separate range of methods that is independent of the natural sciences is needed (Wichmann, 2019, p. 7). The human being is viewed **holistically.** This means that the person their self, the situation in which they find their self, and their history are analyzed (Schumann, 2018, p. 149)

Qualitative and quantitative methods are also based on different scientific theoretical positions (Wichmann, 2019, p. 7).

Positivism is seen as the foundation of quantitative methods and is based on the assumption that a truth exists. It also assumes that human behavior follows certain regularities and runs along cause-effect relationships. Learning about these relationships, e.g., by means of experiments or questionnaires, is the task of the researcher (Wichmann, 2019, p. 8).

In contrast, interpretivism and constructivism are the basis for qualitative methods. Proponents of interpretivism and constructivism see the human being as an actor and reject the stimulus-response (cause-effect) model. Rather, humans attribute meanings to their actions and therefore act according to meaning and intention. The environment is used for social exchange and thus influences the personal attribution of meaning. According to the proponents of interpretivism, not only one, but rather several truths exist. Which truth is considered correct depends on the respective experiences of individual people (Wichmann, 2020, pp. 9–10).

The figure below illustrates the differences between qualitative and quantitative approaches in detail:

Comparison of Qualitative and Quantitative Approaches

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Source: Schumann, 2018, pp. 1–3.

Despite the differences in these two approaches, researchers must decide which one to take.

The most important decision criterion is the scientific question. Not every method is suitable for every question. Qualitative methods are only suitable when a small amount of knowledge on a specific matter exists and background factors are to be researched. In contrast, quantitative methods are useful when extensive knowledge is already available. In practice, the aspects of time and budget also play a major role in the decision (Brosius et al., 2016, pp. 4–5).

The terms *explorative*, *descriptive*, and *explanatory* are also to be noted here. The distinction between explorative, descriptive and explanatory studies is based on a study’s interest in a particular knowledge:

Explorative studies address new or little-researched subjects with many open research questions. These studies aim to describe the subject matter and formulate hypotheses and theories. Both qualitative and quantitative methods are used for this purpose. Descriptive studies address characteristic expressions in larger samples. The focus is on precision. Standardized quantitative measurement methods are often used for this purpose. Explanatory studies are essentially hypothesis testing. They aim to test and further develop theories derived from hypotheses. Explanatory studies use quantitative, as well as experimental or quasi-experimental designs (Döring & Bortz, 2016, p. 149).

The practical examples below are intended to further clarify the differences between the terms:

* Exploratory study: analysis of the population’s fears and concerns related to the food supply at the beginning of the Covid crisis.
* Descriptive study: satisfaction with the current political situation within the population as a whole.
* Explanatory study: verification of the cause-effect relationship of individual people’s character attributes and leadership positions.

### Self-Check Questions

1. Complete the sentence:

A distinction is made between science and *everyday knowledge*. In comparison to everyday knowledge, assumptions and assertions are *verified in* science. *Quantitative* and *qualitative* methods are used for this purpose.

The underlying conception of the human being in quantitative approaches is referred to as *positivism* and as *constructivism* in qualitative approaches.

## 1.2 Objectivity, Reliability, and Validity of Empirical Research

Objectivity, reliability, and validity are among the traditional quality criteria in quantitative research (Wichmann, 2020, p. 39). Quality criteria such as these are of central importance, since, among other things, they ensure that the instruments applied are capable of reliably measuring and that which is to be measured is actually measured. This is relevant because in studies, conclusions are often drawn from, e.g., individual samples of the population as a whole. Strict quality criteria must be met for the results to be truly meaningful to the general public (Kromrey et al., 2016, p. 375).

### Objectivity

Objectivity means that the results of a study are independent of the investigators. There are three types of objectivity: implementation objectivity, evaluation objectivity, and interpretive objectivity (Braunecker, 2016, p.73).

Implementation objectivity: the implementation of a test must not vary from study to study. This means that the conditions under which a study is to be conducted must be precisely defined. The personal interactions between researchers and research participants should be as standardized as possible (Braunecker, 2016, p. 73).

Evaluation objectivity: the evaluators must arrive at the same result independent of each other (Braunecker, 2016, p. 73). This requires precise evaluation rules.

Interpretive objectivity: each researcher should arrive at the same interpretation of the study, if possible. The interpretation should be free of personal mindsets. (Braunecker, 2016, p. 73).

### Reliability

Reliability means dependability. It indicates the degree of measurement accuracy of a survey instrument. Reliable results arise when a measurement shows the same result when repeated. However, one hundred percent reliability is not possible, since all measurements are subject to random error. This means that circumstances can change minimally and result in the generation of different answers. The second reason for not achieving 100 percent reliability is that both the researchers and the participants involved in the study are human beings who are changeable (Brosius et al., 2016, 51ff.).

Reliability refers to intertemporal, intersubjective, and inter-instrumental stability (Kromrey et al., 2016, p. 243). Intertemporal stability is referred to when the same results occur at two points in time when the same phenomenon is measured. However, verification is problematic here since opinions can change over time or the survey situation itself is shaped by other external influences. Testing and improving the reliability of instruments therefore only makes sense if the same conditions (e.g., for certain observations or content analyses) exist during the measurement.

Intersubjective stability means that different people measuring the same phenomenon with the same instruments arrive at the same results. This refers to the fact that the results obtained should be independent of the researcher using the instrument (Kromrey et al., 2016, p. 244).

Inter-instrumental stability means that the same characteristic dimension can be measured with different instruments. So here, certain assertions can be verified with methods that differ from those applied in the first measurement situation (e.g., verification of the participants’ age by evaluating available file data in a first step, then verification using surveys in a second step) (Kromrey et al., 2016, p. 244).

### Validity

The quality of a measurement is directly related to its validity (Eisend & Kuß, 2017, p. 146). Validity indicates the degree of measurement accuracy of that which is actually to be measured. An example here is whether an intelligence test actually measures intelligence. The focus is on content accuracy as well as factual validity (Brosius et al., 2016, 56f).

According to Eisend, the following types of validity can be distinguished:

Validity Test Criteria

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Source: Eisend & Kuß, 2017, p. 152.

These are further explained below (Eisend & Kuß, 2017, 147ff.).

#### Content validity

Content validity measures whether a measurement instrument is suitable and complete with regard to the **constructs.** For example, it verifies whether a questionnaire as a measuring instrument covers all essential aspects in the form of questions or items.

#### Criteria validity

Measuring content validity is significantly more concrete compared to verifying criteria validity. Criteria validity means that the outcome of the measurement of one criterion has a known relationship with the measurement of another criterion. For example, attitudes toward an issue such as environmental protection are related to behavior in this regard. It is therefore possible to verify whether certain criteria correlate with each other.

#### Convergent validity

Convergent validity involves measuring the same concept with two measurement instruments that should have as few methodological similarities as possible, otherwise the similarity of the measured values can be an artifact caused by these very similarities. The results must be similar to fulfill a claim of convergence.

#### Discriminant validity

Discriminant validity exists if the measurements of different constructs vary when using the same measurement instruments (e.g., Likert scale). No differences in the concepts can be mapped if a correlation were to occur.

#### Construct Validity

According to Eisend & Kuß (2017, p. 146), construct validity refers to the agreement between a theoretical construct and a corresponding measurement. It is an indicator of how well a measurement actually captures what it claims to measure.

Qualitative research, as described above, is based on an entirely different view of human beings and different ways of thinking than quantitative research. And it is for this very reason that quality criteria cannot simply be transferred.

There have been numerous attempts in the past to establish a catalog of concrete quality criteria for qualitative research, but none have yet to succeed. Nevertheless, the issues of meaningfulness and reproducibility are indeed at the center of these drafts. From the very beginning – as in quantitative research – emphasis must be placed on precise goal orientation, meaningful results must be produced, and various quality dimensions must be maintained during the research process. The most frequently cited set of criteria in qualitative research in the literature is that of Lincoln & Guba (1985) and is presented below (Döring & Bortz, 2016, 106ff.).

According to Lincoln & Guba (1985), good qualitative research must meet the upper criterion of trustworthiness. This means that the results of the particular qualitative study are truly meaningful and say something about the social reality being studied. Lincoln & Guba (1985) propose four criteria of trustworthiness: Credibility, Transferability, Dependability, and Confirmability.

(Döring & Bortz, 2016, 108ff.):

* Credibility: the results and data from the study are trustworthy.
* Transferability: it is possible to transfer the results to other contexts.
* Dependability: the reproducibility of the entire research process is provided.
* Confirmability: the results are free from subjective opinions and interests of researchers.

Psychologist Ines Steinke (1999) compiled a catalog of seven core criteria for evaluating qualitative research based on the quality criteria of quantitative research and their possible transferability to qualitative research.

These core criteria are:

* Intersubjective reproducibility: reproducibility of the entire study process by third parties.
* Indication: substantiation of the method selection.
* Empirical anchoring: substantiation of hypotheses and theories based on empirical data.
* Limitation: discussion regarding a limitation on the generalization of results.
* Reflective subjectivity: researchers’ reflection on subjective roles.
* Coherence: consistency and freedom from contradiction of a theory or interpretations based on data.
* Relevance: relevance for the scientific progress of knowledge in the sense of subject matter description and theory formulation.

Based on comprehensive discussion and first drafts, it can be assumed that authoritative criteria will also become established in qualitative research in the medium or long term. The advantage of this is that both approaches would then be perceived on the same level, since there would be more specific conditions that scientists must adhere to.

### Self-Check Questions

1. Complete the sentence:

Objectivity, reliability, and validity are central *quality criteria* in *quantitative* research.

Objectivity means that assertions, methods, and results are *independent* of the opinions of the researchers and other influences. Reliability means *dependability*. Validity involves the *accuracy* of a measurement.

Various *criteria catalogs* have been drafted in qualitative research, but *none* have yet to obtain general acceptance.

## 1.3 Causality

The investigation of causal relationship is one of science’s central concerns (Eisend & Kuß, 2017, p. 181). This involves the explanation of relationships between cause and effect. The search for relationships is essential to science. Of course, if these relationships are known, then future occurrences can be better predicted and influenced. There are many considerations in everyday life that involve causality. For example, the extent to which careless parenting is the cause of their children’s poor grades. Likewise, physicians handle the question of what causes the occurrence of symptoms in their patients on a daily basis (Eisend & Kuß, 2017, 181–183).

However, it is to be noted here that the linking of two things does not necessarily mean that one occurs because of the other (Brosius et al., 2016, p. 219). There are particularities that are characteristic of causal relationships and accordingly provide clues in empirical studies as to whether or not a causal relationship exists (Eisend & Kuß, 2017, pp. 181–189):

1. Common variation – cause and effect: if the cause changes, the effect also changes (e.g., increased blood pressure is more likely to lead to a heart attack). However, it should be noted here that correlation does not necessarily imply causality. Thus, cause and effect are necessary conditions, but they are not automatically sufficient for a causal relationship.
2. Intervention or manipulation: insofar as the existence of a causal relationship is known, the cause can be designed to achieve or prevent a particular effect (e.g., therapy to prevent a disease). Manipulating independent variables to affect dependent variables is used in experiments. This will be discussed in detail as the course advances.
3. Temporal sequence: which variable represents the cause and which represents the effect must be determined in advance. The temporal sequence can provide information regarding this. In causal relationships, a change in the cause precedes a change in the effect.
4. Exclusion of alternative explanatory possibilities: here, certain explanatory possibilities are not considered when a particular cause for an effect is anticipated.
5. Meaningful theoretical connection: causal relationships must be systematic and well-founded. A causal chain is frequently developed in social sciences to illustrate cause and effect step by step.

A distinction is made between singular and general causal relationships, depending on whether these relate to individual cases or the general public. Aside from exceptional cases, general causal relationships play a greater role in science. (Eisend & Kuß, 2017, p. 184).

### The Measurement of Causality

Theories that claim to explain causality must always be validated to determine whether they are actually subject to a cause-effect mechanism or whether they merely confirm relationships whose origins are unclear. Validating causality involves hypothesis-testing studies. Experimental designs are the most suitable method for this approach (Döring & Bortz, 2016, p. 50).

In scientific experiments, a distinction is made between independent and dependent variables. Variables are essentially characteristics that can take on different forms. While independent variables are actively changed by the researcher, dependent variables are used to control measurements (Brosius et al., 2016, 220–221) (Kromrey et al., 2016, p. 209).

Example: A scientific experiment can examine the influence of horror films (independent variable) on the level of aggression (dependent variable) exhibited by a viewer (Brosius et al., 2016, p. 218).

### Types of Causal Relationships

There are different types of causal relationships. These are clearly illustrated in the figure below:

Types of Causal Relationships

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Source: Eisend & Kuß, 2017, p. 191.

These are explained below (Eisend & Kuß, 2017, pp. 190–192):

* A direct, simple causal relationship (a) is, for example, when employees’ participation in further training has an effect on their work performance.
* In indirect causal relationships (b), what are referred to as mediators play a role. These are indirect relationships between variables. An example here is that a high proportion of women on a company’s board of directors not only has a direct impact on the company's reputation, social responsibility is also amplified through a mediator. This is illustrated by the figure below (Eisend & Kuß, 2017, p. 192).

Example: Mediator in an Indirect Causal Relationship

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Source: Eisend & Kuß, 2017, p. 193.

* Modified causal relationship means that the influence of an independent variable on a dependent variable is influenced by another independent variable. The role of a moderator then emerges in this context. The direction of the influence on the effect increases or decreases depending on the influence of a particular moderator. In the example above, the motivation for a training measure (V) would serve as a so-called moderator and influence the direction of the influence of the training measure (X) on the work performance (Y).
* A spurious relationship refers to what seems to be a causal relationship, but is incorrectly interpreted and does not actually exist. This is because a common variation of X and Y may be caused by another variable W. An example of this would be that a causal relationship between net income (X) and use of print media (Y) is interpreted, but education (W) has a key influence on both variables and therefore a causal relationship would be incorrectly interpreted.

As mentioned earlier, the application of experiments is typical for the establishment causal relationships.

In an experiment, several independent variables are manipulated to observe how they affect the dependent variable. Manipulation and control are systematic. The focus is only on variables of interest and other influencing factors are excluded (Brosius et al., 2016, pp. 219–220) (Eisend & Kuß, 2017, p. 192).

Of course, this also has an effect on the analysis. Thus, the establishment of statistical parameters begins with the planning of the experiment.

### Self-Check Questions

1. Complete the sentence:

Causality involves *causes* and *effects*.

The most appropriate method for establishing causal relationships is *experimentation.*

Care must be taken not to *misinterpret* causal relationships.

Summary

The main goal of science is the generation of knowledge. In contrast to everyday knowledge, assertions made in science are empirically validated before they are generalized. Quantitative and qualitative methods are applied for this purpose. The selection of a method primarily depends on the research question. However, the quantitative field starts from a completely different conception of the human being than the qualitative field. While quantitative methods are standardized and search for a truth, qualitative methods attempt to holistically investigate the human being and their environment. Objectivity, reliability, and validity are central criteria in quantitative research that must be adhered to. In qualitative research, there are only starting points for the fulfillment of criteria, but no exact specifications. However, transparency and reproducibility are essential in this context.

The search for causes plays a major role in science. Causality involves causes and effects. By ascertaining and analyzing causes, not only can recent occurrences be better categorized, but future occurrences can also be better predicted. However, causality can also be misinterpreted. Experiments are used to determine whether cause-effect relationships actually exist or are merely correlations.

# Unit 2 – The Process of Empirical Research

Study Goals

On completion of this unit, you will be able to ...

... describe the path toward the formulation of a research question.

... formulate hypotheses for a research question.

... select the appropriate research design for different research problems.

... characterize qualitative and quantitative observation methods.

... describe the advantages and disadvantages of different data collection methods.

... understand central evaluation steps of quantitative and qualitative data analyses.

... identify ethical principles of scientific research.

# 2. The Process of Empirical Research

## Introduction

At the beginning of every scientific work there is an interest in knowledge, regardless of whether it is a master's thesis, dissertation, or practical study. A contribution to scientific progress is pursued with one’s own work. But what is the ideal process for arriving at scientific findings? There is no strict guideline for this, neither in quantitative nor in qualitative research, since each research project is individual. Nevertheless, a general process structure is available for orientation. The better the design of a project, the more efficient its implementation. This applies to research projects in the course of master's theses and dissertations, as well as practical projects.

The following unit explains this process structure and offers an overview of common approaches to research projects. It is intended to provide a *common thread* of sorts for the creation of research projects, although in practice this cannot be identically implemented for every project.

Individual aspects are illuminated – from the definition of the research goals and the selection of research design up to data collection and analysis. In addition, an explanation is offered regarding how results can ultimately be interpreted and presented. To complete the unit, ethical and legal aspects of empirical research are discussed.

Schirmer (2009, p. 16) provides an overview of the individual aspects of the research process, which are discussed below:

1. **Research question**:What should be investigated? Theories/Hypotheses
2. **Operationalization**:How should this be carried out? Sample? Strategy? “Instruments”?
3. **Data collection**:observations, surveys, document coding; artifact analyses
4. **Data analysis/interpretation**:data management, static analysis, transcriptions
5. **Publication**:lectures, essays, books, discussions, criticism (again to Point 1.)

In this unit, the research question in Point 1 above is addressed within Section 2.1, Determination of the Research Goal directly below and operationalization/planning follows within Section 2.2, Selection of the Research Design. Data analysis/interpretation and publication are then summarized within Section 2.3, Interpretation and Presentation of Results.

## 2.1 Determination of the Research Goal

At the beginning of every research project, a research topic must be selected and a research question must be formulated. It is very important to address exactly what is to be investigated. After all, a great deal of time is spent on a research project. In addition, it should be meaningful and practically relevant. Furthermore, it should contribute, at least in a small part, to the advancement of the particular discipline (Karmasin & Ribing, 2017, p. 17).

Once the topic has been selected, the first question is how to obtain further information about it. At the beginning, an overview of the state of research should be obtained by searching the literature and reading existing studies on the topic of interest. But also asking around in general to get ideas and impressions about the research topic can be beneficial (Schirmer, 2009, pp. 132–134). Exchanging ideas with colleagues, friends, and mentors can be inspiring on the path to concretizing the topic. This is because a topic can be viewed from different perspectives depending on how it is considered.

Once an overview of the topic is obtained, the research question is then formulated. This must be guided by theoretical and empirical principles, i.e., based on existing theories and findings (Döring & Bortz, 2016, p. 144). The goals and purpose of the work are thus clearly defined and form the basis for any empirical survey. Research questions are ideally formulated as open-ended questions. For example, rather than asking, “Does a relationship exist between two parameters?”, the question should be, “What relationship exists between two parameters?” (Braunecker, 2021, pp. 15–16) (Karmasin & Ribing, 2017, p. 25). For topics that already offer numerous findings, it is advisable to formulate the research question in as much detail as possible.

A distinction is generally made between the following main types of research questions: WHAT questions, HOW questions, and WHY questions. The respective three types of questions refer to different research goals (Wichmann, 2020, pp. 18–19):

**Main Types of Research Questions**

Explanation

Example

Question type

WHAT questions

Discovery and description of patterns and characteristics of individuals and groups

What activities do employees perform to achieve an optimal work–life balance?

WHY questions

Explanation and understanding of reasons for frequency of characteristic attributes and regularities

Why is work–life balance becoming increasingly important for employees?

HOW questions

Demonstration of the relevance of potential change processes

How will the relevance of work–life balance develop in the group of employees in the next 5 years?

Source: Sabine Beinschab, 2021.

WHAT questions are closely related to the scientific activity of describing. They require descriptive answers. WHAT questions also aim to discover patterns and characteristics of, e.g., social phenomena (Wichmann, 2019, p. 19).

WHY questions serve explanation and understanding, as well as form the basis for possible predictions. According to Wichmann (2019, p. 19), they aim at elaborating the reasons for the existence of characteristic attributes and regularities.

HOW questions are asked when change is the goal (Wichmann, 2019, p. 19).

Research activities can thus pursue the goal of describing the subject matter of a study, developing and testing theories or theses, as well as evaluating projects and deriving predictions. Several goals are typically pursued in the course of research projects. It is essential here that these are clearly defined and made known (Schirmer, 2009, p. 134).

Survey goals are to be distinguished from research goals. They concern the question of which aspect of the subject matter of a study should be investigated because it best represents the topic (Schirmer, 2009, p. 134). Survey goals are decisive for the selection of the subject matter of a study and survey methods. For example, if personal experiences are to be investigated, a standardized questionnaire would not be an appropriate method.

With regard to the survey goals, a distinction must be made between the individual and collective levels. In some projects, the focus is on individual people’s opinions and attitudes and the goal is to discuss their background (individual level). In other projects, the goal is to discover how many people engage in a particular behavior (collective level) (Schirmer, 2009, pp. 134–135).

* Example of a survey goal at the individual level: What are individuals’ attitudes toward the topic of electromobility?
* Example of a survey goal at the collective level: How many commuters use electric cars to get to work?

Once the research questions have been formulated, the next step is the formulation of hypotheses. According to Kromrey et al. (2016, p. 47), a hypothesis is initially no more than conjecture about a factual finding. Nevertheless, the definition must be specified in connection with the empirical theory. In the context of social science theories, a hypothesis is conjecture regarding a relationship between at least two facts and circumstances (Kromrey et al., 2016, p. 47). Hypotheses thus provide a preliminary answer to the formulated research questions.

Hypotheses must be formulated briefly and concisely. They must state what is to be investigated as a theory-based empirical assertion. Hypotheses are probabilistic and therefore do not claim to be correct. Hypotheses consist of two variables that are linked with each other. They can be directional or non-directional. The directional hypothesis works with conditional and comparative propositions (if/then and the more/the …). Non-directional means that a relationship is supposed, but makes no assumption about whether it is negative or positive (Braunecker, 2021, pp. 17–18).

The practical examples below are provided for clarification:

* Directional hypothesis: when temperatures rise, dairy consumption increases.
* Non-directional hypothesis: there is a relationship between the consumption of dairy products and the weather.

As mentioned earlier, the research questions, hypotheses, research goals, and survey goals are indicative of the respective research methods.

### Self-Check Questions

1. Complete the sentence:

*Research questions* are the basis for every empirical study. They are formulated on the basis of *open questions*. A distinction is made between WHAT questions, HOW questions and  *WHY questions.*

## 2.2 Selection of the Research Design

Before conducting any scientific study, the research design itself must be determined. This includes the selection of the method, the target group, and the sample.

Method selection depends on various factors. During this selection, it is not only important to use data that are as ideal as possible and best meet the requirements of the respective question, it is also significantly influenced by what is even possible within the framework of a specific project (Schirmer, 2009, p. 136). Financial as well as material and human resources are typically limited, so naturally it makes a difference whether 500 people or 1,000 people are surveyed. Method selection also depends on the time available for a scientific study. This is because the processing and analysis of the data, as well as the publication of the results, involve a great deal of effort and expense. Therefore, extreme caution must be exercised when selecting the method so that the project can actually be implemented. Furthermore, the method applied casts a particular perspective on the data, which can be viewed from an entirely different aspect depending on whether the data are quantitatively or qualitatively collected (Schirmer, 2009, pp. 136–137).

To clarify this, the differences between the two approaches are discussed below:

In quantitative methods, observations regarding a few selected characteristics are systematically assigned numerical values. According to Brosius et al. (2016, p. 4), a characteristic feature of this method is the reduction of complex relationships to a few assertions, which are typically expressed in numbers, percentages, or mean values. Large samples (or full surveys) are used for this purpose. This means that a large number of people are surveyed. Quantitative methods offer little flexibility in a survey because they are bound to standardized measuring instruments, such as questionnaires with primarily closed questions that are presented to the respondents in identical form. The goal is to discover how often certain opinions, attitudes, behaviors, etc. occur.

In contrast, qualitative methods involve which opinions, attitudes, behaviors, etc. exist in the first place. In comparison to quantitative methods, it is not a matter of the numerical surveying of characteristics, but rather more so it attempts to understand what is meant behind what is said. Qualitative research takes an in-depth look at phenomena holistically and analyzes individual motives and content. This allows for open-ended questions in which, e.g., an interview guide can be consulted. Compared to a standardized questionnaire used in quantitative research, the researcher is more flexible in the use of an interview guide. For example, the choice of words or the order of topics can be varied depending on the interview. Findings are not presented in numbers, percentages, or mean values, but rather are verbally described. Qualitative methods use smaller sample sizes due to the high effort and expense involved (Braunecker, 2021, pp. 22–25) (Brosius et al., 2016, p. 4).

If, e.g., the acceptance of an advertisement is to be investigated, the data can be quantitatively or qualitatively collected and thus viewed from different perspectives. Quantitative data can show what percentage of respondents like the advertising. In contrast, qualitative data can reveal which aspects of the advertising the respondents like and the reasons they give for this.

In some studies, it also makes sense to combine quantitative and qualitative methods. For example, a company could conduct a quantitative survey on customer satisfaction as a first step. Then a qualitative study can be conducted afterward to understand why customers are satisfied or dissatisfied.

If foundational research on a particular topic is quite limited, the opposite approach is also conceivable. A qualitative study can collect general parameters on a topic, which are then quantified. For example, in view of the current inflation, it is possible to qualitatively ascertain which worries and fears citizens are characterized by. To discover how widespread individual worries and fears are in the population as a whole, a quantitative study could then be carried out to show the distribution as a percentage.

However, there are different opinions among researchers as to how the combination of methods can be meaningfully integrated into the overall research process. Depending on whether the researchers are primarily quantitative or qualitative, the other method is seen as playing a complementary role (Döring & Bortz, 2016, pp. 72–73).

Nevertheless, researchers must be aware that both quantitative and qualitative methods generally have limitations.

### Self-Check Questions

1. Complete the sentence:

*Quantitative* methods involve the systematic counting of observed characteristics. *Qualitative* methods analyze meanings. While quantitative methods use standardized *questionnaires,* qualitative methods use *interview guides.*

## 2.3 Data Collection and Data Analysis

At the beginning of each study, the group of people for which the study is to be meaningful must be determined. In other words, identification criteria must be used to precisely define the totality of objects about which the study is to provide findings. This defined group is also referred to as a population (Fröhlich et al., 2020, pp. 33–34). Determining a population is necessary because not every research question is relevant for every target group. For example, if a study on the topic of baby food is to be conducted, it would hardly make sense to survey people without children. Rather, e.g., the entirety of all fathers and mothers in Germany who have a child of baby age can be classified as the population here.

### Distinguishing Criteria

A fundamental distinction is made between full surveys, partial surveys, and individual case studies. In a full survey, all persons in a population are surveyed. Partial surveys refer to only a portion of all relevant persons. Individual case studies involve a single object (participant) (Fröhlich et al., 2020, p. 33).

Full surveys and individual case studies are rarely implemented.

The majority of social science studies aim to make generalizable assertions about the subject matter of a study (Schirmer, 2009, p. 174). This is true for both quantitative and qualitative research. Nevertheless, quantitative and qualitative studies have different approaches to selecting cases, with each following their own principles of representivity (Schirmer, 2009, p. 174).

Relationship between Population and Sample

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Source: Fröhlich et al., 2020, p. 35.

In quantitative methods, a subpopulation, also known as a sample, is selected from a population and used to investigate the characteristics of interest. If the sample is drawn using a comprehensible system, this is referred to as a sampling method (Brosius et al., 2016, p. 66).

In order for a sampling method to meet scientific requirements, it must ensure that the sample drawn reflects a reduced image of the population that it is representative. This is absolutely essential because assertions about the entire population are to be made on the basis of the subset investigated.

Among the many forms of sampling methods, a fundamental distinction is made between random sampling, purposive sampling, and arbitrary sampling. Random sampling is the most significant sampling method (Brosius et al., 2016, p. 66). In this method, each element of the population has an equal chance of being included in the sample, which ensures that the sample is representative (Brosius et al., 2016, p. 66).

In purposive sampling, the elements are chosen on the basis of logical considerations. According to Brosius et al. (2016, p. 72), how central the study of these elements is to answering the question is examined. Purposive sampling occurs when respondents who can provide specific input on a topic, e.g., intensive users of a particular product or relevant experts are selected (Brosius et al., 2016, pp. 66–67).

The problem with this sampling method is that representivity is not guaranteed, since the selection is not based on the principle of probability (Brosius et al., 2016, p. 72). The same applies with regard to representivity for arbitrary sampling. In this case, elements are selected on the basis of availability without any particular systematic approach (Brosius et al., 2016, p. 67). Arbitrary sampling applies, e.g., to bystander interviews that are often used by journalists. These interviews are not expressive of the population as a whole.

As already noted, representivity means that the structure of the respondents corresponds to the structure of the population. To be able to assess this, it is necessary to have a knowledge of the structure of the population. For example, to assess whether the proportion of women and men in a partial survey is correct, it is necessary to know their proportions in Germany. Here, the results of the most recent census can be used for this. Because the census is a complete survey, it provides an accurate picture of the distribution of characteristics within the population (Brosius et al., 2016, pp. 61–62).

The figure below illustrates how representivity is interpreted with regard to gender and age. The population column shows how gender and age are distributed in Austria. The respective samples refer to different surveys showing which samples are representative and which are not:

Explanation of Representivity of Samples

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Source: Braunecker, 2016, p. 45.

Among many other things, representative surveys play a major role in political polls. For example, the media or political parties seek to estimate how the population will vote in an upcoming federal election. To this end, representative surveys are often conducted with the population aged 18 and over. In the first step, researchers determine the characteristics for which representivity is to apply. In election surveys, gender, age, level of education, and federal states are often used as traditional characteristics. Thus, the distribution of these characteristics in the population are examined and conclusions are drawn regarding how many people within the total sample are to be surveyed for the study.

When selecting the sample size, the extent of confidence interval plays a role in addition to representivity. This is a question of how precise the results of the sampling should be or with which confidence probability the determined result is accepted (Fröhlich et al., 2020, p. 36). In most cases, empirical social research accepts an error probability of five percent. This means accepting that results may have a random error. In this context, the more people surveyed, the lower the error probability (Fröhlich et al., 2020, p. 36) (Brosius et al., 2016, pp. 65–66).

In contrast to quantitative studies, qualitative studies do not claim to be representative. They are typically based on very small samples in the one to two-digit range and are rarely in the three-digit range. The reason for this is the great amount of time and thus also the monetary expenditure of the methods. While quantitative methods with large samples are often based on a random sampling, qualitative methods are based on a deliberate sample selection. Thus, groups of people are selected from whom a meaningful result is expected with regard to the research question. In qualitative research, a fundamental distinction is made between theoretical sampling, case selection based on a qualitative sampling plan, and the targeted selection of cases (Döring & Bortz, 2016, p. 302).

Theoretical sampling means that a decision is made during the ongoing research process as to which additional participants are to be included in the study. In a study with relatives of dementia patients, e.g., three daughters can be surveyed first. Depending on the findings of the study, the further selection of persons is then refined. For example, if it is found that the frequency of visits or the socioeconomic status of the respondents play a role in the answers, these aspects are included in the further selection of respondents. If the researcher gets the impression that no additional insights are generated after a certain number of surveys, the data collection is terminated. Theoretical saturation is referred to in this context. Thus, in contrast to quantitative research, no final sample size (e.g., a case number of 1,000 persons) is sought, but rather surveys are conducted until the findings are repetitious and nothing new is added. However, there are also approaches in qualitative research that work with a fixed number of respondents. In instances of case numbers based on a fixed sampling plan, cross tabulations are developed and are used to clearly define how many people from which groups should be surveyed (Döring & Bortz, 2016, pp. 303–304) (Kromrey et al., 2016, p. 269). For example, for a study on the topic of sweets, three children aged three to six years three children aged seven to ten years, and three children aged eleven to thirteen years, with two-thirds girls and one-third boys per age group are surveyed. Accordingly, a total of nine clearly defined people are to be surveyed.

Sampling Plan

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Boys** | **Girls** | **TOTAL** |
| **3–6 years** | 1 | 2 | **3** |
| **7–10 years** | 1 | 2 | **3** |
| **11–13 years** | 1 | 2 | **3** |
| **TOTAL** | **3** | **6** | **9** |

Source: Sabine Beinschab, 2022.

Targeted sampling of individuals means selecting a small group of individuals for the study that, for example, correspond to a special target group. This type of selection is useful if these individual cases have a special significance (Döring & Bortz, 2016, pp. 304–305) (Kromrey et al., 2016, p. 270).

## Surveying Observation and Content Analysis

Data collection is an essential part of any empirical study (Döring & Bortz, 2016, p. 322). During this stage, data material is produced and collected in order to answer research questions and test hypotheses. Various methods are used to collect data (Döring & Bortz, 2016, p. 322) (Schirmer, 2009, p. 163).

While this unit has already addressed the difference between quantitative and qualitative research, the three basic methods used in empirical social research are explained below:

* Surveying
* Observation
* Content analysis

#### The Survey

The method of surveying (questioning) is familiar from everyday life and is characterized by two-way communication. For example, a salesperson asks what a customer wants, parents ask their children what they experienced at school, or two people start a conversation on public transportation and ask each other questions. The participants adhere to certain rules, e.g., ensuring that their conversation partners are allowed to finish speaking and treating each other politely.

Surveys in social science have particular characteristic features. They pursue a scientific goal and are therefore planned (Häder, 2019, p. 200). They do not occur by chance, such as a conversation on a train, but rather are artificially induced. Furthermore, the survey scenario is asymmetrical or one-sided, since it is only directed by the surveyor (Häder, 2019, p. 200). Questioning can occur among strangers and remain inconsequential, which is not necessarily the case in a questioning situation between parents and children, for example (Häder, 2019, pp. 199–200).

The survey is the most frequently used method in the social sciences. However, it can be applied in entirely different ways. Among other things, there are different forms of surveys. They can be conducted in person, by telephone, online, or in writing (Ebster & Stalzer, 2017, p. 200).

Due to the population’s increasing **online affinity**, there is a discernible trend toward online surveys. All survey situations have their advantages and disadvantages.

Comparison of Advantages and Disadvantages of Survey Situations

|  |  |  |
| --- | --- | --- |
|  | Advantages | Disadvantages |
| Personal survey (interview) | * Can be used for all topics * Templates (e.g., guideline cards or product samples) possible | * Low willingness of the test persons to participate * High costs for the implementation * Potential influence of interviewers |
| Telephone survey | * Shorter field time * Possibility to control the surveyors * Use of considered sampling strategies, since quotas can be controlled | * Shorter duration compared to face-to-face surveys due to lack of patience of the respondents * No templates possible * High costs |
| Online survey | * Quick and easy to implement * Quotas can be controlled * Cost-effective | * Only internet-savvy target groups are reached * Click-through risk |
| Written or postal survey | * No influence by the surveyor * Lower overall cost | * Not possible to estimate who will participate in the survey * Not possible to estimate what the response rate will be * High effort and expense for address database preparation |

Source: Sabine Beinschab, 2022.

The degree of standardization of a survey can also vary. There are fully standardized surveys, partially standardized surveys and non-standardized surveys (interviews). Fully standardized surveys are based on questionnaires with specific questions (closed or open). It is necessary to strictly adhere to the sequence and formulation of the questions. Fully standardized surveys are used in quantitative research (Ebster & Stalzer, 2017, p. 201). An example of fully standardized surveys is the surveying of consumption habits of dairy product brands. Questions can be asked here regarding which brands are known, how often which brands are consumed, and how one would rate them, e.g., on a school grade scale.

Non-standardized surveys (interviews) are open both in the sequence of questions and in the wording. The basis for this is provided by an interview guide, which is intended to serve as a rough orientation for the interviewer. This contains only open questions. Non-standardized interviews are used in qualitative research and are primarily to collect complex patterns of attitudes or motives (Ebster & Stalzer, 2017, p. 201). An example would be the collection of reasons for being against the Covid vaccination.

In partially standardized surveys, the surveyor has the opportunity to participate in the construction of the questionnaire. This means that the surveyor has the opportunity to ask more detailed questions about certain topics (Ebster & Stalzer, 2017, p. 201). Partially standardized surveys are used, for example, in packaging tests, in which the acceptance of new packaging is surveyed in a standardized and scaled manner, but the surveyor can also ask what has lead to a respective opinion.

A distinction is also made between one-off surveys and panel surveys. One-off surveys, as the name suggests, are conducted only once. In panel surveys, the same respondents are surveyed on the same topic at several points over time. Panel surveys are used, e.g., to measure advertising effectiveness. For example, this means that whether the level of awareness or popularity of a brand changes over time when certain advertisements are placed can be ascertained (Ebster & Stalzer, 2017, p. 203).

#### The observation

Just as we are familiar with questioning from our everyday lives, we are also familiar with observation. In everyday life as well as in scientific observations, the actual focus of the observation must be decided. Then the observation is interpreted in both cases (Häder, 2019, p. 320). Thus, it does not matter whether the speed of service of waiters in a coffee house is observed or a scientific observation in a supermarket about the payment behavior of shoppers at the checkout is made – something is evaluated and classified in both cases.

Scientific observations must meet the following criteria (Häder, 2019, p. 321):

* Observations are based on hypotheses that are to be tested for their validity.
* Scientific observations are subject to a control principle. This means that observations can be carried out by several observers and the results are compared. In addition, a precise documentation of the observed must be made to ensure reproducibility.
* Scientific observations are goal-oriented. The units (participants) to be observed are clearly defined – thus the units that are not to be observed are also implicitly defined.
* Scientific observations are designed to be systematic and intersubjectively understandable.

In observation, the subjective perception and attitudes of the observer(s) influence the results more so than in any other research method (Braunecker, 2016, p. 24). To avoid this, an observation sheet that provides information about what is observed and what is not is created. Furthermore, parameters such as the time and place of observation must be listed. In addition to the observation sheet, audio recordings are also useful in some studies to ensure that information is not lost.

An observation sheet or observation protocol is the basis for the evaluation of an observation. An example is provided in the figure below:

Example: Observation Sheet

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Source: Braunecker, 2016, p. 25.

A fundamental distinction is made between field observation and laboratory observation (Braunecker, 2016, pp. 24–27). Field observation means that the observation occurs in a real situation, e.g., people are observed in a supermarket. Laboratory observation refers to an observation in an artificial situation, e.g., a supermarket can be reconstructed in a **test studio** in which the test persons are to buy something. Laboratory observations have the advantage that boundary conditions can be controlled and the influence of disturbance variables can be prevented (Häder, 2019, p. 325). Thus, according to Häder (2019, p. 325), it is easier to determine the effect of the independent variable on the dependent variable; however, the disadvantage of this isolation is an artificial situation that may be far removed from practice. This also calls the generalizability of the results into question.

The role of the observer can also vary during field work. They can either observe the events from the “outside”, meaning that the observer does not directly enter into the test persons’ situation, but rather merely observes how they behave. In contrast, during participative observation the observer is part of the group being observed (Häder, 2019, p. 324). The advantage of participative observation is that it provides the observer with more detailed insights into group life (Häder, 2019, p. 324). However, the fact that the participant to be observed is influenced by the observer's activity within the group can be a disadvantage.

Furthermore, there are overt and covert observations. With overt observation, in contrast to covert observation, the target person is aware that they are the object of an observation (Häder, 2019, p. 325). With covert observation, the disadvantage that the survey situation could have an influence on the behavior can be avoided. However, according to Häder (2019, p. 325), ethical problems in the research design must be considered with covert observations.

#### Content analysis

Content analysis involves the systematic collection and preparation of content in various media. In particular, it plays a major role in communication science. Compared to the survey, the focus is not on communication with other people, but rather on analyzing existing informational content. This content can be images, films, texts, websites, etc. (Häder, 2019, p. 342) (Brosius et al., 2016, p. 139).

The examples below are intended to provide an overview of the areas in which a content analysis can be made:

* Representation of whether the media report on a specific topic (e.g., how many reports there have been on the topic of AIDS in the last 20 years).

In this context, it is to be noted here that content analyses collect manifest and latent content. For example, a content analysis of newspaper articles can show which information is contained therein (= manifest content), as well as that which is not contained therein (= latent content) (Häder, 2019, p. 342).

* Representation of what the reporting tone is on certain topics (e.g., analyzing positive and negative reports about politicians).
* Representation of what content images seek to convey (e.g., analysis of advertising subjects).

Content analyses, like surveys and observation, follow certain rules in order to be classified as scientific. Every evaluation should be systematic, objective, and intersubjectively understandable. This means that the results are independent of the researcher(s) (Brosius et al., 2016, pp. 141–142).

Content analyses often combine quantitative and qualitative elements. In addition to a quantitative count of elements (e.g., how often a certain word occurs in a text), they also analyze the meaning of the content. As an example, this would mean determining how often the topic of military conscription appears in daily newspapers over a specific period of time and whether it is presented using a positive or negative tone. The basis for every content analysis is a coding scheme in which all dimensions and characteristics to be analyzed are clearly defined (Braunecker, 2021, p. 19).

An example of a coding scheme is shown in the figure below:

Example: Coding Scheme

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Source: Braunecker, 2016, p. 20.

An overview of the data collection methods presented, which have both advantages and disadvantages, is provided in the figure below:

Elements of Surveying, Content Analysis, and Observation

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Source: Brosius et al., 2016, p. 196.

Once the data has been collected, the next step is to process it. Data preparation varies depending on whether the study is qualitative or quantitative.

Data preparation can be roughly divided into the following steps (Döring & Bortz, 2016, p. 580):

* Dataset creation: includes sorting, classifying, formatting, and structuring the raw data. In some cases where a paper-pencil survey is involved, these must also be digitized. For qualitative studies, transcripts must be prepared for analysis. This means that the conversations are written down.
* Dataset annotation: both quantitative and qualitative datasets are supplemented with meta-information (e.g., survey period, method documentation).
* Dataset anonymization: any information that could lead to the identification of respondents is removed or replaced.
* Data cleansing: checking datasets for completeness and plausibility in quantitative studies; post-processing transcripts (e.g., removing dialect words) in qualitative studies.
* Data transformation: verification of the compliance of samples as well as weighting complex samples to increase representivity, if necessary. This means that certain statistical methods are used to arrive at representative results, e.g., when specific quotas have not been met.

Data preparation is followed by data analysis, which varies depending on the method. The goal of the analysis is to answer the research questions systematically and comprehensibly on the basis of the data obtained, or to test hypotheses or formulate new ones (Döring & Bortz, 2016, p. 598). There are a variety of analysis methods and thus, which one is used depends on various factors such as the research topic, research goals, interest in the research, and other circumstances. The more methods of analysis a researcher knows, the better the research is. According to Schirmer (2009, p. 217), it is only their knowledge that can reveal aspects that may be significant in a research question, but are not (initially) captured by the researcher's own instruments.

Broadly speaking, data analysis can be summarized in the following steps: Data analysis begins with a classifying and descriptive phase, followed by the interpretation of the case under study. The next step is a comparison of individual cases with each other or a comparison with theories. Theses are then derived from this. A distinction is made between object-analytical and interpretive-analytical methods. While object-analytical methods tend to be based on descriptions of dimensions or frequencies, interpretive-analytical methods involve the interpretation of attributions of meaning (Schirmer, 2009, pp. 216–218). For example, the investigation of the purchase frequency of yogurt in a weekly comparison would be object-analytical, whereas the consideration of the reasons for the purchase frequency would be interpretive-analytical.

Different methods for data analysis are applied depending on whether qualitative (non-numerical) or quantitative (numerical) data material is available (Döring & Bortz, 2016, p. 598). Generally speaking, evaluations of qualitative methods are significantly more time-consuming than those of quantitative methods.

Typical data analyses conducted in the quantitative domain are as follows (Braunecker, 2016, pp. 123–125):

* Frequency counts: the absolute and percentage frequency of each characteristic expression is determined.
* Calculation of mean values: values are added and divided by their number.
* Cross tabulations to render assertions regarding subsets, such as age groups or federal states: combined frequency count of two characteristics.
* Correlations: two values are correlated with each other and verification of whether one value increases when another one increases is carried out.

How the data is analyzed depends on the research questions and the response options.

Typical analysis methods are clarified in the figure below:

Typical Methods of Quantitative Research Analysis

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Source: Braunecker, 2016.

The table contains ten different datasets, i.e., data per survey participant.

* Frequency count: codes are assigned for the place of residence so that the evaluation can be numerically carried out in a simple manner. Codes are understood to be categories. This means that those who live in the city were assigned Code 1 and those who live in the countryside were assigned Code 2. The frequency count shows that 70% of the respondents live in cities, since Code 1 was given in 7 out of 10 cases.
* Mean value: to discover how often respondents go on vacation on average, the information in the “vacations per year” column is added up and then divided by the total number of 10. The result here is that respondents go on vacation an average of 1.6 times per year.
* Cross tabulation: a cross tabulation can be useful to examining the distribution of urban and rural residents with regard to vacation behavior. The two characteristics are crossed with each other.
* Mean comparison: a comparison here of the average vacation behavior of urban and rural residents.
* Correlation: an investigation as to whether there is a correlation between the age of the respondents and the frequency of vacations.

Qualitative data analyses involve non-numerical data material, e.g., texts or images. The goal of qualitative data analyses is to derive relevant assertions from a quantity of material. Transcripts often form the basis for qualitative data analysis. Transcripts are the written recordings of interviews that have been conducted. In principle, there are different procedures for analyzing the data material (Döring & Bortz, 2016, p. 599) (Braunecker, 2016, p. 121).

An overview of the different analysis procedures is provided in the figure below:

Qualitative Data Analysis Procedures

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Source: Döring & Bortz, 2016, p. 599.

Among others, category-forming analyses are very common. Here, the data material is divided into meaningful analysis units, such as sentences or paragraphs. The individual analysis units are assigned codes that are ultimately combined into overarching categories. These are response dimensions that are independent in terms of content and can be described. The identification of specific result categories is an extremely intensive process due to the scope of the data material (Döring & Bortz, 2016, p. 599) (Braunecker, 2016, p. 121).

Allocation of Codes and Categories in Qualitative Research

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Source: Döring & Bortz, 2016, p. 599.

In qualitative data analysis, a fundamental distinction is made between two levels of analysis: case-related and cross-case analysis. In case-based analysis, transcripts are worked through from front to back. In this way, the meanings of individual text passages are revealed step by step in the overall context. Then the data material deemed to be important is segmented into meaningful units. These analysis units are examined with regard to content and/or formal characteristics. What processes or phenomena lie behind them and what overarching concepts of the research problem they exemplify are verified. The text passages are assigned a code that stands for specific characteristics. At the end of the case-related evaluation, a code list and a summary case description regarding the sociodemographic description of a person, as well as the summary of the most significant interview assertions, is rendered.

The cross-case evaluation is based on the fact that all qualitative data material has been worked through as described. The code list is ultimately revised, since it is to be applied to different cases. Ideas for linking codes in the form of overarching categories also emerge. The overarching categories are further developed, divided into subcategories, and described with their respective characteristic values. Thematic analysis is an example of cross-case evaluation. Here, a summary of all central aspects of the phenomenon under investigation occurs in connection with the research problem (Döring & Bortz, 2016, pp. 603–605).

Qualitative analyses can be carried out either manually or with the help of computer programs.

### Self-Check Questions

1. Complete the sentence:

The methods mainly used in empirical social research include *surveying*, observation, and *content analysis.*

Cross tabulations are often created in *quantitative* research. They are used to make assertions about subsets such as age groups or gender.

1. Complete the sentence:

In representative samples, the structure of the respondents corresponds to the structure of the *population*.

Qualitative studies do *not* claim to be representative. Compared to quantitative studies, these work with *smaller* sample sizes.

## 2.4 Interpretation and Presentation of Results

The presentation of the results strongly depends on the intended audience. Depending on whether the results are published in a scientific journal or presented to the general public, it is therefore important to pay attention to how they are ultimately presented. In all instances, it is important to pay attention to clarity. This means that results must be presented in clear, understandable language, and that ambiguities or uncertainties must not be concealed. Problems that arise in the course of the study must also be communicated. Thus, truthfulness is an absolute requirement. Alongside this, information should be presented as comprehensively as possible. Intersubjective reproducibility plays a key role and particularly so in the presentation. Exact documentation of all research steps from the very beginning is extremely helpful in this regard (Schirmer, 2009, pp. 140–141).

Häder (2019, p. 478) recommends citing the following information in scientific publications:

Key Data for Scientific Publications

Key data for scientific publications

Study Sponsor

Study goal

Questionnaire and survey standards used

Intended audience

Sample

Fieldwork method/procedure

Data cleansing

Manner of presenting the results

Source: Sabine Beinschab, 2022.

Diagrams are often used in quantitative research to depict the results as clearly as possible. Generally speaking, they should include the following elements (Braunecker, 2016):

* Exact research question
* Presentation of the basis (who was surveyed/the results of all or those of subgroups are presented)
* Number of respondents
* Display of values in percentages or absolute numbers
* Meaningful headline/interpretation

Example: Diagram with Complete Data

Ein Bild, das Diagramm enthält.

Automatisch generierte Beschreibung

Source: Statista, 2023.

Interpretive texts are easier to grasp when they are detached from numbers.

In qualitative research, quotes are often used to make results even more tangible. Rather than “55% of 16 to 29 year-olds read an e-book in 2020,” the headline can be phrased as “More than half of 16 to 29 year-olds read e-books.”

Results are verbally described in qualitative research. The multitude of individual texts that have been included in the analysis are clearly delineated from each other in terms of meaning and summarized in clear dimensions. Particularly meaningful notations are added to illustrate the results (Braunecker, 2016, pp. 140–141).

Example: Qualitative Evaluation

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Automatisch generierte Beschreibung

Source: Braunecker, 2016, p. 140.

### Self-Check Questions

1. Complete the sentence:

The form in which results are presented depends on the *intended audience.* In the quantitative field, *diagrams* are used to better illustrate results. In the qualitative field, *quotations* are used to present results in a more tangible manner.

## 2.5 Ethical and Legal Aspects of Empirical Research

Researchers must adhere to ethical guidelines in all their activities during the course of an empirical study. This means a responsible handling of participants, as well as the data in all stages.

However, it is to be noted here that scientists increasingly find themselves in a field of tension. On the one hand, they strive to seek findings that correspond to the truth. On the other hand, they are under extreme pressure in their work due to various factors. The figure below clearly illustrates this area of tension:

Requirements for Ethical Behavior and Incentives for Unethical Behavior

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Automatisch generierte Beschreibung

Source: Eisend & Kuß, 2017, p. 225.

Scientists are aware that truthfulness, objectivity, and diligence are important criteria for their research. At the same time, the pressure on researchers is growing, since fast, clear, and original results are expected. This pressure leads to blurring. It is to be noted here that there are very few extreme cases of falsification and plagiarism. Nevertheless, science must address minor, as well as major, ethical problems related to the elimination of data (*outliers*), incomplete presentation of results, or incorrect information about authors. Scientists must therefore reflect on their actions (Eisend & Kuß, 2017, p. 219–222) (Braunecker, 2021, p. 62).

Scientific ethics begins with the research questions. Scientists must ask themselves which research questions are ethically justifiable and when the limits are reached. This is an important point, since scientists have a considerable responsibility. In practice, for example, studies are conducted with children aged five to eight years with the goal of developing influencing strategies for this target group with regard to the consumption of sweets (Eisend & Kuß, 2017, p. 228). Here, too, scientists are caught between two conflicting priorities: they want to generate new findings – albeit in the interest of companies. Alongside this, they are aware that their findings and the potentially derived strategies contribute to negatively influencing children in their health behavior.

In addition to responsibility, scientists also have power. They can intentionally design questionnaires in such a way that a desired result is achieved. Suggestive questions are referred to in this context, i.e., questions that influence the response behavior of the respondents (Döring & Bortz, 2016, p. 403).

Introductions before questions are often used for this purpose. An example of this is provided below:

“Company XY has been operating successfully in the market for 30 years. How do you feel about the company?”

The introduction establishes a positive association with the company, which may make the respondent evaluate the company more favorably.

In addition to the wording of the questions, the sequence of questions in a questionnaire also plays a role (Eisend & Kuß, 2017, p. 231). For example, when considering a customer satisfaction survey, whether overall satisfaction is asked at the beginning or whether questions regarding detailed aspects come first and then overall satisfaction is surveyed at the end can make a difference.

How the research is conducted is ultimately of particular importance in its connection with research ethics. However, compared to research in the natural sciences or medicine where animal experiments are used, the ethical problems in this context are minor. In marketing research, this issue particularly plays a role in experiments. This holds especially true when people are not aware that they are part of an experiment and the question of ethical correctness arises. As a general rule, the personal freedom and self-determination of study participants must not be impaired (Brosius et al., 2016, p. 225). An important aspect of quantitative and qualitative studies in this context is also the handling of study participants’ sensitive data. There are clear rules for this, which are anchored in the ICC/ESOMAR Code (e.g., stress when filling out questionnaires) (Kreis et al., 2021, pp. 323–324) (Braunecker, 2016, p. 63).

The principles for working with test persons are summarized below (Döring & Bortz, 2016, p. 123):

* Participation in studies should be voluntary on the part of the study participants.
* The study participants should be protected from any stress/impairment as much as possible (e.g., stress caused by uncomfortable questions).
* All data must be anonymized and treated confidentially.

After the survey has been conducted, data preparation and data analysis follow. Erroneous data and outliers are identified during this stage. Interventions of any kind can influence the results and be considered as manipulation. However, statistical data analysis can also involve interventions that are ethically questionable. For example, scientists can use different statistical tests until they arrive at the result they want. This is possible because statistical tests have different characteristics and therefore also produce different results (Döring & Bortz, 2016, p. 136) (Eisend & Kuß, 2017, p. 237).

When the time comes to publish the results, it is necessary to include all the criteria on research ethics listed at the beginning of this unit. Only interpreting and publishing portions of study results is problematic, since this can also result in presenting an entirely different picture.

Scientific publications should cite who is responsible for published studies. Authorship, however, is sometimes a contentious issue. This is because the number of publications is the currency in science. The more publications a scientist has, the more successful they are. With larger groups, the selection of scientists to appear on the publication is increasingly more difficult. Agreements on the citation of authors must therefore be made at an early stage. It would be ethically incorrect to list persons who have not contributed to the publication of a study. The order in which authors are named reflects the share of authorship – here, too, care should be taken to ensure truthfulness (Eisend & Kuß, 2017, p. 241).

### Self-Check Questions

1. Complete the sentence:

Researchers should *reflect on* their behavior in order to meet ethical standards. Clear rules on ethical standards for market and social research are anchored in the *ICC/ESOMAR Code*.

Summary

Empirical research is subject to a structured process. First, the research goal must be defined and the essential research questions are formulated from this. These research questions form the hypotheses, i.e., the preliminary assertions or assumptions based on previous observations.

Hypothesis formulation is an important step in scientific research because it guides the research process and allows specific assertions to be validated. Hypotheses are often used in conjunction with empirical studies to collect and analyze data to determine whether a hypothesis is confirmed or refuted.

This is followed by an appropriate selection of the research design, which indicates how the data is to be collected and then the data analysis is carried out using appropriate analysis methods of quantitative research.