

The Use of Scientific Research Tools in Quantitative and Qualitative Research in Media and Communication Sciences

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Abstract: Research in media and communication sciences relies on a set of tools widely used in scholarly articles, academic books, and theses. Empirical, or quantitative, research depends on numerical data, statistics, percentages, and related measures, whereas qualitative research depends on reading, analysis, and reasoned interpretation. The principal tools used in these approaches are scientific observation, the research interview, the questionnaire, and content analysis. This article examines each tool in terms of its definition, characteristics, distinctive features, significance and objectives, procedures, advantages, and disadvantages.

Keywords: scientific research tools; quantitative and qualitative research; observation; interview; questionnaire; content analysis

Introduction

Researchers across disciplines must identify and precisely define the research tools used to collect the information and data required for a scientific study or research project. Any empirically oriented study requires quantitative data numbers, statistics, percentages, and the likelihood a researcher or research team collects from the target population through a selected sample.

The nature of the topic, the study population, and the sample determine the type of research tool selected or the combination of tools required. One study may use observation; another may use interviews; and a third may combine observation, interviews, and a questionnaire.

The choice depends on how the researcher obtains information relevant to the topic and the stated objectives of the study. The methodological section must therefore justify the selection of a particular tool or combination of research tools.

Media and communication sciences constitute a field of knowledge and research that draws on several methods, including experimental, survey, historical, and ethnographic approaches, to achieve the greatest possible degree of scientific accuracy. The field also requires research tools such as scientific observation, interviews, questionnaires, and content analysis to collect relevant information and data.

This article presents the principal research tools used in media and communication research to study the sender, message, medium, audience, and nature of the effect. It examines observation, interviews, questionnaires, and content analysis as tools used in quantitative and qualitative approaches, addressing the definition, characteristics, significance, application, advantages, and disadvantages of each.

Scientific Research Tools

Scientific research requires methodological, theoretical, and applied frameworks that complement one another and serve the study. With appropriate scholarly justification, the researcher selects the method or methods suited to the topic and identifies the tool or tools needed to collect quantitative information and data from the study sample.

In media and communication sciences, including newer academic specializations in communication, media, and digital media, researchers and students rely on observation, interviews, questionnaires, and content analysis when preparing journal articles, scholarly books, and undergraduate, master's, and doctoral theses.

Methodological scholars divide scientific research tools into two categories. The first comprises scientific observation and interviews, described as communicative means of collecting research material data, information, and evidence. These tools are communicative because the researcher interacts directly with the study sample; they are nonmaterial and intangible. The second category comprises questionnaires and content analysis, which are noncommunicative because the researcher does not interact directly with the study sample, particularly when using electronic questionnaires or conducting content analysis. These tools are classified as material and tangible.¹

The order in which these tools are used depends on the nature of the research topic. The researcher selects one tool or a combination of technical and research tools according to the sequence of the research process and the manner in which information is obtained from the research population and sample.

The Concept of Scientific Research Tools

Scientific research tools: These are the means and techniques used to collect information and data related to the research questions and to test the research hypotheses. Such tools vary from one study to another and range from measurement devices and examination instruments to testing procedures.²

Data-collection tools: Sometimes called research instruments, these tools include observation, interviews, questionnaires, and others. They must demonstrate validity, reliability, and objectivity so that researchers can confidently use the collected data to test the hypotheses formulated in the methodological section.³

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- 1 Said Ismail Sini, *Basic Rules of Scientific Research*, 1st ed. (Al-Risala Foundation for Publishing and Distribution, 1994), 190.
 - 2 Sana Muhammad Sulayman, *Data-Collection Tools in Psychological and Educational Research*, 1st ed. (Alam al-Kutub, 2009), 17.
 - 3 Ahmad Sulayman Ouda and Fathi Hasan Malkawi, *Fundamentals of Scientific Research in Education and the Humanities*, 3rd ed. (1992), 43.

Scientific research tools facilitate the research process and the collection of data directly related to the topic. They enable researchers to collect, organize, and analyze findings associated with the outputs published at the conclusion of a research project or study.⁴

Research tools are numerous, and their selection and use depend on the nature of the study. Data-collection methods include observation, interviews, questionnaires, and content analysis, among others.⁵

Scientific research tools may also be understood as research instruments that vary in complexity, interpretation, design, and administration and through which the researcher tests the study's hypotheses.⁶

Thus, scientific research tools may be defined comprehensively as the techniques, instruments, and means that assist researchers in collecting data, information, and knowledge related to the study sample and in answering the research questions and testing the hypotheses.

1. Scientific Observation

Scientific observation is an important tool and technique for collecting information and data in scholarly research. It is among the oldest methods of data collection. The researcher observes the subject and sample in terms of behavior, practices, actions, reactions, effects, and related features. Observation is the systematic, methodical, planned, and purposeful monitoring of phenomena, problems, and events, including their material and environmental components, and their development, directions, and relationships. Its purpose is to interpret and determine relationships among variables, predict the behavior of a phenomenon, and direct it toward serving individuals and meeting their needs.⁷

Observation: Observation is a fundamental step in scientific research. It functions as a lens through which hypotheses are supported or refuted, and rigorous observation ensures the accurate collection and documentation of critical evidence and the development of explanations and theories.⁸

Types of Observation

Observation may generally be classified as follows:

Degree of control: Because the observer is an essential and active element in scientific observation, observation may be either structured or unstructured.

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- 4 Nader Ale Ebrahim, *Research Tools: Scientific Writing Tools for Writing a Literature Review and a Paper* (Centre for Research Services, University of Malaya, 2016), 4.
 - 5 J. E. A. Osang et al., "Methods of Gathering Data for Research Purpose and Applications Using IJSER Acceptance Rate of Monthly Paper Publication," *IJSER Journal of Computer Engineering* 15, no. 2 (2013): 61.
 - 6 Prabhat Pandey and Meenu Mishra Pandey, *Research Methodology: Tools and Techniques* (Bridge Center, 2015), 58.
 - 7 Ribhi Mustafa Alyan, *Scientific Research: Its Foundations, Methods, Approaches, and Procedures* (Bayt al-Afkar al-Dawliyya, 2001), 115.
 - 8 Catherine Eberbach and Kevin Crowley, "From Everyday to Scientific Observation: How Children Learn to Observe the Biologist's World," *Review of Educational Research* 79, no. 1 (2009): 39.

Simple observation: Used in exploratory studies, this type involves observing and examining the phenomenon or condition under study without a predetermined plan governing the topic, objectives, or behavior to be observed.

Structured observation: This type is organized in advance. The researcher collects data in a previously defined setting and specifies the events, observations, and behaviors to be recorded.

Degree of researcher involvement: Observation is divided into two types:⁹

Participant observation: The researcher directly observes the research population and sample while participating in the setting, particularly when collecting information about actions and behaviors.

Nonparticipant observation: The researcher observes participants without taking part and without making them aware that their behavior is being recorded for a scientific study. The phenomenon and the behavior of the study sample are monitored and recorded from a distance.

Characteristics of Scientific Observation

Scientific observation is a tool for collecting empirical information and data in quantitative and qualitative studies.¹⁰

Scientific observation requires sensory perception, particularly visual perception.

Observation is among the most direct methods for studying individuals through their actions and behavior.

Steps in Conducting Observation

- Define the general objectives to be achieved.
- Specify the temporal and spatial parameters of the topic to be examined.
- Identify the study population and the sample to be observed.
- Determine the means and techniques needed to obtain accurate information and data, such as cameras and video-recording equipment.
- Prepare an observation guide for recording all observations related to the study topic. Because observational designs are highly flexible, such guides provide a useful framework for the data that the researcher subsequently collects, organizes, and analyzes.¹¹

2. The Research Interview

The research interview ranks second in frequency of use. It is a means of collecting information and data in scholarly research.

Interview: An interview is a conversation in which the researcher asks an interviewee questions related to the research topic. The questions may be open-ended, closed-ended, or a combination of both, and the interview may be conducted individually or in a group.¹²

9 Alyan, *Scientific Research*, 117.

10 Pandey and Pandey, *Research Methodology*, 65.

11 M. Teresa Anguera and Antonio Hernández Mendo, "Observational Methodology in Sport Sciences," *E-Balonmano.com: Journal of Sport Science* 9, no. 3 (2013): 140.

12 Bayoumi Muhammad Sakhawi, *Introduction to Research Methods*, 1st ed. (Dar al-Fikr al-Arabi, n.d.), 85.

Classifications of Interviews

By objective: Interviews may be classified into three types:

Survey interview: An exploratory or survey interview is used to obtain information and data from individuals, including information about public opinion and consumer preferences.

Diagnostic interview: A diagnostic interview seeks to identify and investigate the causes and factors associated with various problems.

Therapeutic interview: A therapeutic interview aims to assist individuals experiencing psychological or social problems and to identify solutions that may help them overcome those problems.¹³

By medium: This classification includes the following types:

Direct interview: Also known as a face-to-face interview, this type involves an in-person meeting between the researcher and one or more respondents without the use of an electronic communication medium.

Telephone interview: This type makes it possible to reach individuals within the sampling frame by telephone.

Conditions for Conducting an Interview

- Define the research topic precisely.
- Define and simplify the study's concepts and terms so that respondents can understand them.
- Obtain relevant background information about the individuals to be interviewed.
- Clarify the purpose of the interview for both the researcher and the respondent.
- Consider the temporal and spatial context of the interview.
- Use flexible and varied questions and encourage respondents to answer them.

Importance of the Interview

The interview is a research tool that ranks second after observation.

It assists the researcher in collecting and analyzing the necessary information and data.¹⁴

Its importance lies in revealing the feelings, emotions, actions, and behaviors of the individuals interviewed.¹⁵

Steps in Conducting an Interview

Defining the interview objectives: The researcher must define the general objectives for which the research interview is designed.

Selecting the sample: Identifying the members of the research sample is essential. In the interview process, the researcher asks questions and records the answers provided by the selected participants.

13 Jayne Eaden, Margaret K. Mayberry, and John F. Mayberry, "Questionnaires: The Use and Abuse of Social Survey Methods in Medical Research," *Postgraduate Medical Journal* 75, no. 885 (1999): 397.

14 Aqil Husayn Aqil, *Steps of Scientific Research: From Defining the Problem to Interpreting the Result* (Dar Ibn Kathir, 2010), 256.

15 Kamal al-Dishli, *Scientific Research Methodology* (Directorate of Books for University Publications, 2012), 93.

Defining the temporal and spatial framework: The researcher must determine an appropriate time and place for conducting the interview with the study sample.

Determining the type of interview: The researcher must determine the type of interview to be conducted.

Designing the interview guide: The guide consists of questions designed to structure and delimit the interview. The researcher must ensure logical progression, coherence, and avoid overlap. Closed-ended, open-ended, and semi-open-ended questions may be used, depending on the purpose of each question.¹⁶

Conducting the interview: The researcher must explain the topic and purpose clearly, ask precise and comprehensible questions, and restate them when a respondent does not understand. The researcher should also verify the accuracy and credibility of the responses by asking follow-up questions that confirm the information provided.¹⁷

Recording the interview: Recording is an important stage in the interview process. Two principal methods are generally used to record interview data and information.

Analyzing the data: This is the final stage of the research interview. The researcher converts the information obtained into statistics, figures, and findings to be presented at the conclusion of the study.

Advantages and Disadvantages of the Interview

Advantages

- Face-to-face interviews may be conducted in various locations, including the home and workplace, and may involve either an individual or a group.
- The researcher may record interviews directly with a notebook and pen or by electronic means; the data may then be transcribed and entered into a computer.
- Interviews can provide information about the past and anticipated development of the phenomenon under study and the study sample.¹⁸
- They allow the researcher to repeat and clarify questions for the study sample.¹⁹

Disadvantages

- Respondents may provide misleading or inaccurate information.
- The findings may be affected by the interviewer's preconceptions.²⁰
- Limitations may arise from respondent-related factors, such as limited comprehension or emotional instability.
- The findings may be affected by differences in outlook among respondents.

16 Nabil Hamidcha, "The Interview in Social Research," *Al-Bahith Journal of Humanities and Social Sciences* 4, no. 8 (2012): 103.

17 Ahmad Badr, *Foundations and Methods of Scientific Research* (Academic Library, 1973), 339.

18 Pandey and Pandey, *Research Methodology*, 65.

19 Alyan, *Scientific Research*, 110.

20 Pandey and Pandey, *Research Methodology*, 61.

- Face-to-face interviews may introduce bias into attitudes and opinions.²¹
- Data analysis may be difficult, especially when the volume of qualitative data is large.²²
- Interviews may be demanding for the researcher, particularly when they require travel between locations.

3. The Questionnaire

A questionnaire is used to collect information from dispersed sources. It is a paper or electronic form through which respondents provide answers to a set of questions.

Questionnaire: The questionnaire is a data-collection tool and is among the most widely used instruments in survey research because it can collect information about a specific topic from a large number of individuals, whether or not they are located in the same geographic area.²³

Questionnaire: A questionnaire consists of a series of written questions presented to a research sample for response. It is usually administered directly by the researcher.²⁴

Types of Questionnaires

By type of question and response: This classification includes the following:

Closed-ended questionnaire: Also called a standardized questionnaire, it consists of questions with predetermined response formats.²⁵

- Responses are limited to options such as “yes,” “agree,” “do not know,” and “disagree.”

Open-ended questionnaire: This type contains questions that allow participants to answer freely in their own words and without predetermined response limits.²⁶

By method of preparation and distribution: This classification includes the following:

Paper questionnaire: The researcher prepares, prints, and distributes a sequence of paper sheets to be read and completed by the research sample.

Electronic questionnaire: The questionnaire is prepared electronically and distributed through social media platforms or email.

Conditions for Administering a Questionnaire

- The questionnaire should be of an appropriate length for the study sample, printed on suitable paper, and presented in a clear, legible format that facilitates reading and comprehension.
- The questions must cover all dimensions of the research topic.
- The questionnaire must state the name of the researcher or responsible institution, the study title, the research problem, and the purpose of the questionnaire.

21 Osang et al., “Methods of Gathering Data,” 61.

22 Karim Abawi, “Data Collection Methods (Questionnaire and Interview)” (paper presented at the Training Course in Sexual and Reproductive Health Research, Geneva Workshop, Geneva, November 28, 2017), 14.

23 Muhammad Abd al-Hamid, *Scientific Research in Media Studies*, 1st ed. (Alam al-Kutub, 2007), 353.

24 Osang et al., “Methods of Gathering Data,” 62.

25 S. Roopa and M. S. Rani, “Questionnaire Designing for a Survey,” *Journal of Indian Orthodontic Society* 46, no. 4, suppl. 1 (2012): 273.

26 Chinelo Igwenagu, *Fundamentals of Research Methodology and Data Collection* (LAP Lambert Academic Publishing, 2016), 45.

- The questionnaire must contain clearly defined sections, main headings, and subheadings, and both its questions and pages must be numbered.²⁷

Characteristics of the Questionnaire

- It is a tool of scientific research.
- It is administered according to methodological procedures established in advance by the researcher.
- The questionnaire enables the researcher to collect data that cannot be obtained from scholarly sources such as books, reports, and records.²⁸
- The questionnaire must be clearly presented and well organized, because effective design encourages participants to read the questions carefully and answer accurately.
- Another person may assist in completing the questionnaire, particularly when it is directed at children.
- The terms and concepts used in drafting the questionnaire must be defined clearly and precisely so that participants can answer accurately.
- It is more economical in time and effort than other research tools.

Conditions for Formulating Questionnaire Questions

- Questions must correspond to the sections of the questionnaire defined by the researcher.
- Questions must be arranged in a coherent sequence that demonstrates a logical and continuous progression of thought.
- Questions likely to embarrass respondents should be avoided because they may prompt hasty answers or cause respondents to stop participating.
- Both open-ended and closed-ended questions may be used.
- Double-barreled questions must be avoided; each item should ask only one question.

Steps in Preparing and Administering a Questionnaire

Defining the study topic: The researcher must define the topic precisely by stating the main title, the type of study, and the nature of the research population and sample.

Formulating the questions: The researcher develops questions that correspond to the general topic and arranges them logically, placing easier questions at the beginning and more difficult questions later.²⁹

Dividing the questionnaire into sections: The researcher organizes the questionnaire into sections, each with a specific heading and a set of questions aligned with the section title, research problem, and objectives.

Identifying the target group: The researcher identifies the sample to which the questionnaire will be administered.

27 Abd al-Hamid Abd al-Majid al-Baldawi, *Scientific Research Methods and Statistical Analysis* (Dar al-Shorouk, 2007), 22.

28 Pandey and Pandey, *Research Methodology*, 58.

29 Pushpanjali Krishnappa and Renuka Piddennavar, "Art and Science of Questionnaire Development," *Journal of the Indian Association of Public Health Dentistry* 2011, no. 18 (2011): 155.

Obtaining expert review: After piloting the questionnaire, the researcher assesses its validity and reliability by submitting it to three or five experts in the relevant field. The experts correct and revise the questions and recommend changes to their type or length, including the addition or deletion of items.³⁰

Distributing the questionnaire: This is the final stage of administration. The researcher distributes the questionnaire to the relevant individuals or bodies to obtain information and data for subsequent quantitative and qualitative analysis.

Advantages and Disadvantages of the Questionnaire

Advantages

- It gives participants sufficient time to reflect without psychological pressure and allows them to choose when to respond, unlike an interview.
- It saves effort, time, and financial resources because the researcher generally does not need to travel and the questionnaire is comparatively easy and inexpensive to design.
- It enables research to cover a wide geographic area.
- It can elicit sensitive or potentially embarrassing information that may be difficult to obtain through other research tools.
- It permits the use of open-ended, closed-ended, and combined question formats.

Disadvantages

- Participants may respond carelessly or select answers at random.
- Participants may be unable to understand certain questions because of ambiguous wording or poor formulation.
- In some cases, the information sought is already available from other sources, and respondents may therefore become frustrated and decline to participate.³¹
- Respondents may become bored, particularly when the questionnaire is lengthy.
- The researcher or administrator may favor particular positions or attitudes and thereby bias the responses obtained.

Content Analysis

Content analysis: Muhammad al-Jawhari defined content analysis as a means by which sociologists may observe behavior indirectly by analyzing what individuals write, that is, their verbal symbols.³²

30 Adlane Zerrouk, "News Values and Their Construction in the Main News Bulletins of Public Television Channels in the Maghreb: A Survey and Analytical Study of the News Bulletins of the First Public Channels in Algeria, Tunisia, and Morocco, 2014–2016" (PhD diss., University of Algiers 3, 2017), 50.

31 Badr, *Foundations and Methods of Scientific Research*, 335.

32 Ismail Abd al-Fattah and Mahmoud Mansour Hiba, *Media Research: Trends and Readings in Journalistic and Media Research* (Alexandria Book Center, 2009), 192.

Content analysis: Content analysis is an empirical method associated with quantitative research. It requires the researcher to identify categories and operational symbols in the text under study after defining the relevant concepts.³³

Characteristics of Content Analysis

Content analysis is a scientific research tool used to collect information and data.

It enables the researcher to analyze form and content simultaneously.

It may be applied to written, audio, visual, and electronic materials.

It enables researchers to verify findings by returning repeatedly to the source material, whether written, audio, or visual.

Objectives of Content Analysis

- Collect information and data for scholarly research.
- Identify the orientations of the communicator.
- Reveal the formal and substantive dimensions of various media and communication outlets.
- Identify the sender's objectives and personal characteristics.

Steps of Analysis

- Define the research topic.
- Define the research problem.
- Define the study population and sample.³⁴
- Define the units of content analysis.
- Select the categories of analysis.³⁵
- Prepare the content-analysis coding sheet.
- Assess the validity and reliability of the operational-definitions guide used for content analysis.³⁶
- Record and analyze the data and derive the study's findings.

Categories of Content Analysis

Content-analysis categories are divided into two principal groups: categories of form and categories of content.

Categories of form: These categories describe the formal features of the material under study and generally answer the question, "How was it said?"

Space category: This category measures the amount of space allocated in a newspaper or magazine.

Time category: The researcher identifies the duration of the material under study and measures it in seconds, minutes, or hours.

33 Judita Kasperiūnienė, Monika Briedienė, and Vilma Žydzūnaitė, "Automatic Content Analysis of Social Media Short Texts: Scoping Review of Methods and Tools," preprint, January 2020, 2–3.

34 Taha Abd al-Ati Najm, *Media Research Methods* (Dar Kalima, 2015), 194.

35 Sam Goundar, "Research Methodology and Research Method" (2013), 25.

36 Zerrouk, "News Values and Their Construction," 49.

Temporal dimension of news: This category identifies references to time, such as yesterday, today, tomorrow, or next week.

Journalistic and media genres: The researcher identifies the journalistic genres and forms used to write and edit the news item.

Technical formats: These media-writing formats include the inverted pyramid, the graduated inverted pyramid, and the upright pyramid.

Language: Language may be classified as direct or indirect, simple or complex, standard Arabic or colloquial Arabic, or a mixture of standard and colloquial Arabic.

Content categories: These categories are divided as follows:

Topic categories: These answer the question, "What topics are addressed in news bulletins?" Topics may be religious, political, military, security-related, social, or economic.

Regional category: This category classifies news by geographic scope as local, regional, or international.

Image category: This category examines the types of images used in media content.

Source category: This category identifies the sources from which media institutions obtain material and content.

Objectives category: This category identifies the objectives that the content under study seeks to communicate or achieve.

Actors category: This category identifies the individuals or actors represented in the content by examining such characteristics as sex, age, social background, educational and cultural level, group affiliation, religion, and ethnic origin.

Units of analysis: These include the word, topic, paragraph, character, time, and space.

Advantages and Disadvantages of Content Analysis

Advantages

- The source material remains available to the researcher and may be consulted throughout the study.
- The researcher may return to the material under study to verify the findings.

Disadvantages

- The analysis may produce erroneous conclusions or judgments.
- The findings of content-analysis studies are predominantly descriptive.
- The available documents may be limited or incomplete, thereby affecting the findings.
- The researcher may use predetermined categories or units of analysis that compromise the credibility of the findings.

Conclusion

This article has shown that research in media and communication sciences generally relies on four principal tools: observation, interviews, questionnaires, and content analysis. Each tool has distinctive characteristics, procedures, advantages, and disadvantages. The nature of the topic, research method, study population, and sample determines which tool or combination of tools should be selected. Hence, one study may rely solely on observation, another on observation and interviews, and another on observation, interviews, and a questionnaire.

These tools are used in both empirically oriented quantitative research and qualitative research, including the preparation of scholarly articles, books, theses, and dissertations.

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