# DEVELOPMENT OF QUALITY INSTRUMENTS AND DATA COLLECTION TECHNIQUES

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Abstract. Data collection methods and tools are the techniques and tools used in research to collect various data which are processed quantitatively or qualitatively, then arranged systematically. Data collection is defined as research activities that aim to collect field data needed to answer research questions in qualitative research or to test hypotheses in quantitative research. Research instruments are tools that use various types of information in research to be collected, processed quantitatively or qualitatively and then arranged systematically. Qualitative researchers as human instruments function to determine research focus, select informants as data sources, collect data, assess data quality, analyze data, interpret data and make conclusions on all stimuli from the environment that must be estimated to be meaningful or not for research. Quantitative research uses test instruments, non-test instruments and test inventories. For disclosure of facts to become data, the instruments used must be of good quality in the sense of being valid and reliable so that the data obtained will be in accordance with the facts or circumstances when collecting, studying, studying the problem under study.

Keywords: Instruments, Quality, Data Collection Techniques.

## 1. INTRODUCTION

Articles are interpreted as a process of writing about systematic investigations that aim to provide information to solve problems. As a systematic activity, investigations must be carried out using certain methods known as study methods, namely. obtain information for a specific purpose and use it scientifically. This scientific method must be based on scientific characteristics, namely rational, empirical and systematic [1]. Traits of good research. Research is a process carried out by humans to obtain answers to a problem, fact or study that one wants to prove objectively. It is said to be objective because the research method uses scientific programs, is competitive, does not deviate from existing facts, and is empirically proven and measurable [2].

Data collection is a technique or method that can be used by investigators to collect data [3]. Techniques for expressing words that are abstract and not contained in objects, but may only be seen in their use; questionnaires, case studies, observations, investigations, documentation and others. The investigator may use one or more techniques depending on the problem faced or studied. In scientific investigations, so that the data we collect is valid, we need to know how we collect data in the investigation, so that the data we obtain can strengthen the truth of a concept.[4]. Data collection techniques must be implemented so that the data collection process goes well, researchers must also use various methods and procedures that apply to obtain more valid and accurate information from the data collection [5].

The study tool is a very important part and is included in the study methodology because the study tool is a tool used to collect, study, examine the problem under study. An instrument is a tool, so a study instrument is a tool that functions to detect phenomena that apply in investigations to prove the truth or refute certain hypotheses [6]. The validity of the data obtained is largely determined by the qualitative or validity of the instruments used, in addition to the data collection methods used. This is easy to understand because the instrument is to express facts into data, so that if the instrument used is of sufficient quality in the sense that it is valid and reliable, then the data obtained will be in accordance with the facts or circumstances of collecting, studying, studying the problem under study. An instrument is a tool, so a study instrument is a tool that serves to show the phenomena [7] that apply in an investigation to prove the truth or refute certain hypotheses. A good instrument must have good validity and reliability. In order to get a good instrument, apart from being tested, legitimacy and trust also need to follow the principle of providing the instrument [8].

Implementing the Instrument is the process of preparing the assessment instrument, because the assessment gives us information about the object to be studied. Therefore, the provision of instruments is an important step in the investigation process that cannot be separated. This is done so that the continuity of the data collected with the test subjects is preserved as part of the hypothesis test [9]. Instruments play a very important role in determining the quality of an investigation, because of validity or data collection in a study, we may use existing instruments and may also use homemade instruments.[10]. Existing instruments are generally instruments that are considered standard for collecting data, if there are expert instruments available to collect studymodifying data then we may immediately use the instrument, provided that the theory used as the principle of providing the instrument is in accordance with the theory referred to in our study. In addition, the construct modifiers measured by the instrument are also the same as the construct modifiers to be measured in the study. However, if the instrument expertise is not yet available to collect study-modifying data, so the

instrument for collecting this modifiable data should be made by the investigators themselves [11].

1. Definition of Data Collection Methods and Research Instruments.

The Indonesian dictionary defines data collection as a process, method, act of collecting or compiling data [12]. Data collection methods are techniques or methods that can be used by investigators to collect data. Methods (rules or techniques) refer to words that are abstract and do not exist in objects, but can only be seen through the use of questionnaires, case studies, observations, investigations, documentation and others. Data collection is carried out to obtain the research results needed to achieve the study objectives. The goal stated in the form of a hypothesis is the initial answer to the study problem. This answer still needs to be validated empirically and data collection is needed for that [13]. Instruments are tools that are used to do something (eg tools used by technicians, medical devices, optics and chemistry), tools, ease of investigation to obtain collected data as processing materials. Data collection tools are tools that investigators select and use in their activities to collect data in a way that makes their activities more systematic and their work easier [14]. [15] Argues that the instrument is a measuring tool used to obtain objective quantitative research results on various characteristics of change. Meanwhile [8] Explained that the study instrument is a tool that is usually used quantitatively to record the state and function of psychological characteristics. Psychological characteristics are technically classified into cognitive and non-cognitive characteristics. that for cognitive traits, the stimulus is the question [16]. In terms of noncognitive nature, the stimulus is a statement. From the descriptions of several experts above, it can be concluded that data collection methods and tools are techniques and tools used in research to collect various data that are processed quantitatively or qualitatively and then arranged systematically.

#### **II. RESEARCH METHODS**

Data collection techniques are the most important step in the investigation process because the main purpose of the investigation is to obtain information. The data collection technique required here is the most appropriate data collection technique to obtain information that is valid and can be trusted. Investigation, the level of data collection is a very important level in the process and results of the investigation carried out. The readiness of data collection in the study directly influences the investigation process and decisions. In principle, data collection is an activity that uses established methods and tools for validity and correctness [17]. In summary, data collection is defined as a process or activity carried out by investigators to search for or collect various phenomena, information or conditions of the investigation site in accordance with the scope of the investigation. Practically, data collection is carried out using quantitative and qualitative study methods.

Differences in the collection of quantitative and qualitative data are found in the research tools or data collection methods. Quantitative data mining tools can vary depending on the type of data you wish to obtain. This quantitative data collection method is usually carried out through surveys such as questionnaires or surveys, while qualitative data is used as a research tool, namely. self-study through descriptive notes made during study. About records of various activities, such as interviews with informants, observations or observations, documentation, literature studies [18].

Based on these circumstances, the notion of data collection is also interpreted as a process that describes the process of collecting data in quantitative and qualitative investigations. Data collection may also be interpreted as an investigative activity that aims to collect field data needed to answer research questions (in qualitative investigations) or to test hypotheses (in quantitative investigations). Data collection techniques were determined quantitatively and qualitatively using the study methodology. Data collection techniques known in qualitative investigations: Observation, Focus Group Discussions (FGD), Indent Interviews and Case studies (Case study). Known data collection techniques in quantitative investigations: Questionnaires, case studies and documentation[19]. Some common data collection techniques: a. Perception

Observation is fundamental to all science. Scientists may only work based on data, namely based on facts they obtain through observation, through observation investigators learn about behavior and the meaning associated with it. [20]. Through observation, the investigator learns about the behavior and the purpose of the behavior. Distinguishing observations from participating observations, open and covert observations, unstructured observations, each method of observation is used as a source of study data according to the nature of the material object Observations of participants [21]. Participant observation is a set of strategies in an investigation aimed at obtaining complete information. This is done by developing close and deep intimacy with groups of humans in their natural environment. In this study, the researcher sets several goals and places himself as part of the object of study. [22] states that in participant observation, the investigator observes what people do, hears what they say, and takes part in their activities. In participant observation, the investigator observes what people are doing, hears what they say, and takes part in their activities.

Observation of participants in the field of qualitative inquiry involves many roles of participants involved in the field, namely:

- 1) Full participation, namely the role of participants in this relationship to become full expert observers. Participants receive information about everything of concern, including information that may be classified.
- 2) Inclusion as a participant, ie. the investigator acts as a participant.
- 3) His status as an expert in communications is actually just pretending, so it's not real, both physically and psychologically.
- 4) Participants as participants, just like investigators as participants, take part in what the informants do as they are noticed, although not completely.

5) Complete participants, in this case the participants and the place of observation are separated, information is sent only in one direction, so that the object does not feel cared for [9].

#### a. Overt or covert surveillance

The description above explains that the characteristics of qualitative research include finding and uncovering facts on the ground in a natural setting. Therefore, investigators need to be careful and wise in applying field data collection techniques to informants so that the information obtained is truly natural. So, if you observe the investigator collecting data, state the source of the data directly (the person being studied that the investigator made observations in the study). In this type, all the processes carried out by the investigator are known to everyone. But in one day the examiner is not direct or hidden in his observations, because it is still difficult to evade the information sought. It is possible that, if done honestly, the reviewer may not make any observations. When we do qualitative research, we know that depth of knowledge comes first. To gain access to deeper data, researchers need tools, both used by themselves and by respondents, to facilitate the data collection process

b. Unstructured observation

Qualitative studies are carried out in an unstructured manner because the focus of the study is not clear [23]. The focus of observation develops during observation activities. If the study problem is clear, such as in a quantitative investigation, then observations may be made in a structured way using observation guidelines. Unstructured observations are observations that have not been provided systematically for what is being considered, the examiner does not know exactly what is being considered. This study does not use standard instruments, only observation markers. Besides that, [24] said that qualitative research has phases and objects to be considered. Observation ratings namely; Descriptive observation, focused observation and selected observation. And objects that may be considered are space (place), actor, and action (activity). These three cases can be further developed into several main cases, namely; space (place) in its physical form; The culprits are everyone involved in the situation; activity, what people do in this state; objects, that is, objects that are in this place; activity namely certain activity; events or occurrences, namely a series of actions, time, which is about the sequence of activities, goals, namely what is to be achieved, and the feelings experienced and expressed. a. Questionnaire

The questionnaire, which defines itself, is a data collection technique in which respondents are sent a list of questions. Depending on the way the questions in the Questionnaire are prepared, they are divided into two parts:

1) Open questionnaire (open and items)

This is a questionnaire that does not provide a choice of answers to written questions, so that respondents can answer them freely/openly according to their opinion or point of view and knowledge. the benefits of an open investigation; (c) Ask a very simple question

(a) Ask a very simple question,

(b) Giving freedom to respondents to answer and express what is in their hearts and minds.

Apart from the advantages of an open questionnaire, an open questionnaire also has several disadvantages;

- (a) It is very difficult for researchers to process and classify answers because respondents' answers are different, answers take a long time to process, things researchers need to read one by one,
- (b) Can lead to boredom among researchers because writing is difficult to read, sentences from respondents' answers are difficult to understand,
- (c) Respondents who have little free time develop a sense of laziness.Kuesioner tertutup questionnaire whose written questions are equipped with answer choices so that the respondent has to choose just one of the answers given. advantages of closed surveys;
- (a) Help researchers process incoming responses,
- (b) The time it took the researcher to group the answers was short because the list maker could help them.
- (c) It is easier for respondents to choose answers
- (d) Respondents need time to enter answers.

The disadvantages of closed voting are;

- (a) When preparing questions for researchers, care must be taken not to be interpreted differently (ambiguity).
- (b) Respondents feel their ability to answer is limited [25].
- f. Interview

Interviews are personal questions and answers that the interviewer conducts with the respondent to obtain the necessary information. [26] Defines an interview as a meeting between two people to exchange information and ideas through debriefing, which leads to communication and building shared meaning on a particular topic, and an interview is also a meeting between two people for information and ideas, exchanged through debriefing to give meaning to a particular topic.

[27] Field interviews have proven to be a co-production between researchers and members. Members are active participants whose understanding, feelings, and cooperation are an important part of the conversational process that expresses subjective meaning. The interviewer's presence and participation in how he or she listens, engages, encourages, interrupts, deviates, initiates, and finishes responses is an integral part of the respondent's story. Field interviews are a co-production between researchers and members. Members are active participants whose understanding, feelings and cooperation are an important part of the discussion process which reveals subjective meanings. The presence and participation of the interviewer in listening, attending, encouraging, interrupting, deviating, starting the topic and completing the answers is an integral part of the informant's story.

Various interviews or interviews offers different types of interviews; structured interviews; semi structured interviews (semi structured interviews); unstructured interview (Unstructured Interview). Interview phase. [28] explained that using interviews to collect data in qualitative research involves several steps, namely:

1) Decide who you want to interview.

- 2) Write down the main points to be discussed
- 3) Start or open the interview.

- 4) Confirm and close the summary of the results of the interview.
- 5) Write down the results of the interview in the notes.

6) Identify the following outcomes from the interviews that were accepted.

- Interview contents, several types can be found in interviews, namely:
- 1) Experience and actions of the accused, namely. H. what he does or what he usually does.
- 2) Opinions, views, responses, interpretations or assessments of something.
- Feelings, emotional reactions, whether he is worried, worried, happy, excited, suspicious, irritated and so on about something.
- 4) Information, facts, what is known about something.
- 5) A feeling that is seen, heard, touched, tasted or smelled clearly described.
- 6) Education, occupation, place of origin, place of residence, family, and others.

The considerations above have been compiled to anticipate vacancies you may want to inquire about. Question material can include the time dimension, what the respondent has done in the past, present and in the future. And in principle, the questions to be formulated must be based on the direction of the research or answer the research objectives. namely the interview tool1)

1) Notebook:

Serves to record all conversations or conversations with data sources, now there are many small computers, notebooks that can be used to record the results of conversations.

2) Recorder:

This feature records all conversations or speech. The use of a tape recorder in interviews must be communicated to informants whether it is permissible or not.

3) Camera: take pictures if researchers need them.

## III. RESULTS AND DISCUSSION

1. Qualitative Research Instruments

The most important qualitative assessment instrument is the reviewer himself. Investigators may use tools to collect data such as tape recorders, videotapes, or cameras, but the use or use of these tools really depends on the investigator himself. Because in a qualitative study the instrument or study tool is the reviewer himself, the reviewer must be approved. Attestation of investigators, including; understanding of the methods of qualitative investigation, mastery of insight into the field under study, the willingness of the investigator to enter the object of study -both academically and logically. Qualitative investigators as human instruments function to determine the focus of the study, select informants as data sources, collect data, assess data quality, analyze data, interpret data and make conclusions on their findings. [29].

a. Investigators as instruments or study tools because they have the following characteristics:Pengkaji sebagai alat is sensitive and can react to any stimulus from the environment that must be considered meaningful or not for investigation.

- b. The investigator as a tool may adapt to all aspects of the situation and may collect various types of data at once.
- c. Each situation is the whole meaning that there is no instrument in the form of a test or questionnaire that can capture the whole situation except humans.
- d. A situation that involves human interaction cannot be understood solely with knowledge and to understand it, we need to experience it often, dive into it based on our knowledge.
- e. The investigator as an instrument may immediately analyze the data obtained may interpret it, generate hypotheses immediately to determine the direction of observation, to test hypotheses that arise immediately Only humans as instruments may make conclusions based

on data collected at one time and use them immediately as feedback to obtain approval, amendment, improvement or maintenance.

Researchers as instruments (called Participant-Observer) besides having advantages, also contain several weaknesses.

- 1) The advantages of the investigator as an instrument include:
- a) Investigators may see, feel, and experience immediately what applies to the subjects they study. Thus, the reviewer will gradually understand the meaning hidden behind the reality that can be seen (verstehen). This is one of the objectives to be achieved through qualitative research.
- b) The reviewer will be able to determine if the data conclusions are sufficient, the data is saturated, and the investigation is stopped. In a qualitative investigation, data collection is not limited by instruments (for example, questionnaires) that deliberately present investigations to certain variables.
- c) The investigator may continue to collect data, analyze it, make continuous reflections, and gradually "build" a thorough understanding of something. Remember, in a qualitative study, the assessor does "build" a hidden reality in society.
- 2) Weaknesses of the reviewer as an instrument are:
- a) It is not easy to maintain the objectivity and neutrality of investigators as investigators. Subject involvement is fine in qualitative investigations, but if not careful, investigators will unknowingly mix up the field data they are concerned with their own thinking.
- b) Collecting data using the investigator as the main instrument is strongly influenced by the investigator's ability to write, analyze, and report the results of the study. The reviewer must also have sensitivity and "insight" to capture hidden symbols and meanings, because this learning experience is very personal, the reviewer often has difficulty expressing it in written form.

The reviewer must have sufficient patience to follow and record the changes that occur in the subject being studied. The qualitative reviewer must be prepared for the results of the study to be plural (various), often out of reach, and difficult to determine when they will be prepared. definite time may be made, but the accuracy of the schedule (time) in a qualitative investigation is impossible to achieve as in a quantitative investigation. Reserve qualitative studies in data collection, instruments that may be used include:

## a. Interview Instrument

The interview instrument is used in a qualitative study because it can reveal information across the ages, namely relating to the past, present and future. And the data generated from the interviews are open, comprehensive, and unlimited, so that they can form a complete and comprehensive information in uncovering qualitative investigations in observations or Observation Instruments.

2. Quantitative Research Instruments

Qualitative studies, the study instrument is the reviewer himself, so in a quantitative study, the instrument needs to be made and become an independent instrument from the reviewer. Investigators must be able to make instruments, whatever they are, as well as possible [30]. In general, quantitative investigative study tools are divided into two areas, namely tests and non-tests. The test as a study tool is a tool that contains a series of questions that need to be answered by the respondent to measure an aspect according to the objective of the study. In addition to tests, there are instruments in the form of non-tests, such as attitude scales or lists of statements that are used for investigators using review techniques, interview directions for investigators using interview or interview techniques, observation directions for investigators. using observational techniques, the scale is a subjective measure made on a given scale. While these scales provide rough information, they are sufficient to provide specific information about programs or individuals. With this tool, you can easily get an overview of the exposure, especially the person running the task exposure, which shows the frequency of the feature occurring. The interview guide contains a list of questions that may be asked of respondents. Although the observation guide has a list of types of activities that may apply and be considered. Quantitative investigations use tools in the form of:

## a. Test Instruments and Inventories

Tests and inventories are used to collect quantitative study data because the test instruments measure a person's ability in certain fields, such as mathematical talent, musical talent, language proficiency and so on. While the inventory is to determine certain characteristics (psychology) of individuals. From these two instruments the data collected is in the form of numbers which will then be tested statistically to determine the purpose of the investigation.

b. Questionnaire or Questionnaire Instrument

Questionnaires or Questionnaires are used in quantitative investigations, to collect informed data and facts. For example data on educational stage, age, personality assessment and so on. The type of questionnaire data is in the form of numbers, then it will be processed with the help of statistical analysis to find out the results of the data. Questionnaires in data collection must have been determined and tested beforehand. c. Observation Sheet Instrument

Observation sheets used in the collection of quantitative assessment data should be provided first and tested, and used in data collection in the form of numbers.

#### d. Document Instruments

Documents used in collecting quantitative study data as data collection or data recap consisting of data values in the form of numbers and may be selected using them

#### **IV. CONCLUSION**

The definition of data is a technique or method that may be used by investigators to collect data. The study instrument is a tool that uses various types of information in an investigation that is collected, processed quantitatively or qualitatively and then arranged systematically. Data collection techniques: interviews, documents, observations, reviews. The most important tool in qualitative inquiry is the investigator himself. Use tools to collect data, such as magnets, video tape or cameras. However, the usefulness or use of this tool really depends on the reviewer himself. The quantitative study instrument is divided into two parts, namely tests and non-tests. The test as a study tool is a tool that contains a series of questions that need to be answered by the respondent to measure an aspect according to the objective of the study. In addition to tests, there are instruments that are not tests, such as attitude scales or statements used by investigators using a review type questionnaire technique, interview directions for investigators using interview or interview techniques, observation directions for investigators. using observation techniques, and others.

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