

Definition, elements and stages of elaboration of research protocols

Definição, elementos e etapas de elaboração dos protocolos de pesquisa

Definición, elementos y etapas de elaboración de protocolos de investigación

Received: 09/23/2020 | Reviewed: 09/25/2020 | Accept: 09/26/2020 | Published: 09/27/2020

Ronison Oliveira da Silva

ORCID: <https://orcid.org/0000-0003-0709-4081>

Instituto Federal do Amazonas, Brasil

E-mail: ronison.msc@gmail.com

Júlia Angélica de Oliveira Ataíde Ferreira

ORCID: <https://orcid.org/0000-0001-9870-8581>

Instituto Federal do Amazonas, Brasil

E-mail: juliaangelicaantigo@ifam.edu.br

Jose Anglada Rivera

ORCID: <https://orcid.org/0000-0002-6709-6794>

Instituto Federal do Amazonas, Brasil

E-mail: angladarivera@gmail.com

Silvestre Sales de Souza

ORCID: <https://orcid.org/0000-0003-0075-7348>

Instituto Federal do Amazonas, Brasil

E-mail: silvestre.souza@bol.com.br

Daniel Nascimento-e-Silva

ORCID: <https://orcid.org/0000-0001-9770-575X>

Instituto Federal do Amazonas, Brasil

E-mail: danielnss@gmail.com

Abstract

Although it is recognized as an instrument capable of guaranteeing transparency and assertiveness in scientific investigations, the research protocol is still little known by the academic community. The present study addresses research protocols with focus on three aspects: what they are, what characterizes them and how they are developed. The method used was the conceptual bibliography, based on the scientific papers available in the Google Scholar and Science Direct databases. The definitions found in the scientific literature

consulted were interpreted based on techniques of semantic and content analysis. The results showed that: a) the research protocol is the outline of the methodology for collecting and analyzing data in order to achieve the research objectives, b) the protocols are composed of four stages: introductory, procedural, practical and drafting and c) the steps follow a procedural logic, in which the introductory excerpt describes the theme of the study, the procedural phase details the strategies used to collect and analyze data, the practical phase consists of obtaining the data that will support the research analysis and the editorial part it concerns the preparation of manuscripts for publication. The conclusion shows that the research protocols are methodological instruments used to guarantee the validity and reliability of the results.

Keywords: Reliability; Scientific process; Procedural logic.

Resumo

Embora seja reconhecido como um instrumento capaz de garantir a transparência e a assertividade investigações científicas, o protocolo de pesquisa ainda é pouco conhecido pela comunidade acadêmica. O presente estudo aborda os protocolos de pesquisa com foco em três vertentes: o que são, o que lhes caracteriza e como são elaborados. O método utilizado foi o bibliográfico conceitual, com base nos trabalhos científicos disponíveis nas bases de dados *Google Acadêmico* e *Science Direct*. As definições localizadas na literatura científica consultada foram interpretadas com base em técnicas de análise semântica e de conteúdo. Os resultados apontaram que: a) o protocolo de pesquisa é o esboço da metodologia para coleta e análise dos dados a fim de atingir os objetivos de pesquisa, b) os protocolos são compostos por quatro etapas: introdutória, procedimental, prática e redacional e c) as etapas seguem uma lógica processual, na qual o trecho introdutório descreve a temática do estudo, a fase procedimental detalha as estratégias utilizadas para coletar e analisar dados, a fase prática consiste na obtenção dos dados que irão fundamentar as análises da pesquisa e a parte redacional diz respeito à preparação dos manuscritos para publicação. A conclusão mostra que os protocolos de pesquisa são instrumentos metodológicos utilizados para garantir a validade e a fidedignidade dos resultados.

Palavras-chave: Confiabilidade; Processo científico; Lógica processual.

Resumen

Si bien sea reconocido como un instrumento capaz de garantizar la transparencia y asertividad en las investigaciones científicas, el protocolo de investigación es aún poco conocido por la

comunidad académica. El presente estudio aborda los protocolos de investigación con enfoque en tres aspectos: qué son, qué los caracteriza y cómo se desarrollan. El método utilizado fue la bibliografía conceptual, basada en los artículos científicos disponibles en las bases de datos Google Scholar y Science Direct. Las definiciones encontradas en la literatura científica consultada fueron interpretadas con base en técnicas de análisis semántico y de contenido. Los resultados arrojaron que a) el protocolo de investigación es el esquema de la metodología de recolección y análisis de datos para alcanzar los objetivos de la investigación, b) los protocolos se componen de cuatro etapas: introductoria, procedimental, práctica y de redacción y c) los pasos siguen una lógica procedimental, en la cual el extracto introductorio describe el tema del estudio, la fase procedimental detalla las estrategias utilizadas para recolectar y analizar los datos, la fase práctica consiste en obtener los datos que apoyarán el análisis de la investigación y la parte editorial se trata de la preparación de manuscritos para su publicación. La conclusión muestra que los protocolos de investigación son instrumentos metodológicos utilizados para garantizar la validez y confiabilidad de los resultados.

Palabras clave: Fiabilidad; Proceso científico; Lógica procedimental.

1. Introduction

The main pillar of scientific research is trust. In other words, when the scientist makes efforts in search of a better understanding of a problem or phenomenon, it is recommended that his study values the observance of certain procedures that will give his investigative process more reliability and credibility (Ketokivi & Choi, 2014; Martins, Mello & Turrioni, 2014; Yin, 2015). This is a mandatory step for researchers to observe when it comes to carrying out their scientific research processes.

The theoretical factor concerns the need for reinforcement both in terms of conceptual aspects as well as the elements and steps necessary for the realization of an efficient and effective protocol. Although the significance of this instrument is recognized, it is necessary to carry out more recent studies that deepen the existing knowledge on this topic, whose demand still needs to be considered and met by scientists and researchers.

The second reason that encouraged the realization of the study is simple: to contribute in an objective way so that future researchers, especially those working in professional and technological education or technological education, know and practice the discoveries presented here. This is relevant, as there is still a misconception that research protocols are a type of questionnaire. It is for this reason that it is convenient to clarify that the research

protocol and questionnaire are two methodological instruments that have different meanings and purposes. It is worth noting that one of the functions of the research protocol is to delimit the results obtained in the data collection stage in order to maximize the probability of achieving the objectives initially set out at the beginning of the investigative process.

Another factor that corroborated with the performance of this study concerns the Covid pandemic19 (Gama Neto, 2020). It is understood that the pandemic scenario caused by this disease has caused society to hear the term “protocol” more frequently in the news. This reinforces the need for not only the academic community, but also the population in general, to be informed about the meaning, structuring elements and stages of elaboration of this methodological instrument so relevant to the practice of the scientific process.

The expectation of contributing to the scientific community with the realization of this textual production is to make this methodological procedure better known. It is inferred that the state of the art regarding research protocols is still small compared to the conceptual scope found in international studies (Binik & Hey, 2019; Kumar & Joshna, 2019; Martín, Manjarrés & Martín, 2019; Poncet et al., 2019). Through the assertive understanding regarding the concepts elucidated in the present construct, it is expected that both teachers and students will become aware of the meaning and logic of the conception and execution of this research document. The research protocols make the scientific process more fruitful, consistent and reliable due to transparency (Capocasa & Volpi, 2019; Ketokivi & Choi, 2014) with which data are collected and analyzed in studies undertaken by scientists and researchers.

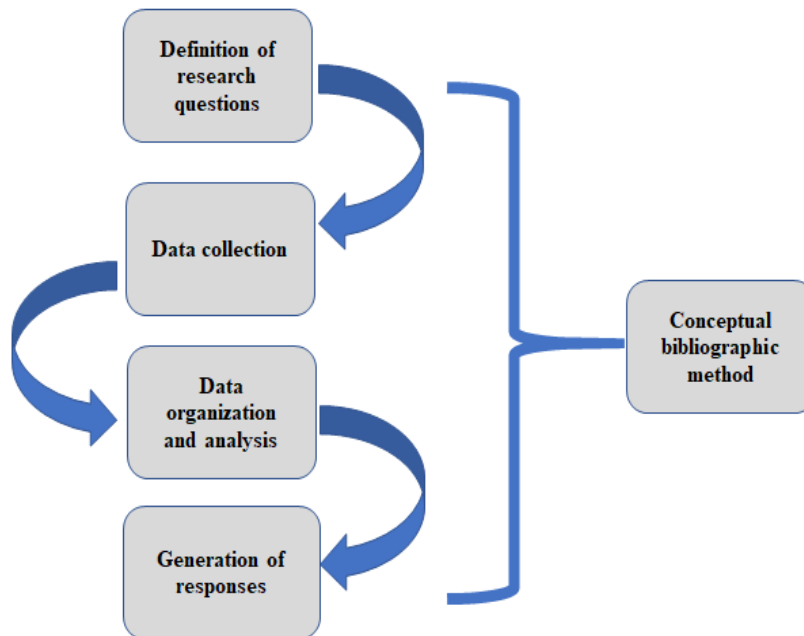
2. Methodology

For the present textual construction, the conceptual bibliographic method sent by Nascimento-e-Silva (2012) was used, as shown in figure 1. This method is notable for the existence of a research question, which is also known as a guiding question (Brei, Vieira & Matos, 2014). It is emphasized that to be considered as scientific, the research process needs to focus on the search for a consistent answer that fully and unequivocally satisfies the question initially defined by the researcher. It is what is commonly known as a problem (Lukosevicius, 2018) related to an investigation, which still lacks a viable solution.

After defining the guiding question (Brei et al., 2014), the next step is to search the databases for the existing answers in the state of the art related to the subject under study (Nascimento-e-Silva, 2012). The bases in this sense are the places recommended by science that contain articles, dissertations, theses, and other research carried out by authors who have

previously dealt with the object of study. For this study, the databases consulted were Google Scholar and Science Direct.

Figure 1. Steps of the conceptual bibliographic method.



Source: Prepared by the authors based on Nascimento-e-Silva (2012; 2019).

The question that guided the information collection process was “What is a research protocol?”. The statements contained in the content of the texts were started with phrases such as "Research protocol is ...", "Research protocol means ...", and "Research protocol consists of ...". The articles that in their content did not contain the answers to answer the guiding question of the study were discarded.

After the survey carried out in the databases, the explanations were cataloged in a reference table entitled mass of data (Nascimento-e-Silva, 2012; 2019). This instrument consists of a table inserted in a page in the Microsoft Word application, composed of two columns. The first of these, called “references”, contains the bibliographic data of the article that had been consulted in the bibliographic survey carried out at the beginning of the research. The second column, on the other hand, brings in full the answer located in quotation marks, accompanied by the respective page number from which the statement was extracted.

After this cataloging was carried out, the next phase was the generation of the answer, based on the materials previously researched based on the equivalence terms contained in the statements cataloged in the databases. In summary, this answer consists of three periods. The

first of them reports what the search term means and begins with the phrase "Research protocol is ...". The next two sentences explain in a didactic and objective way what was said in the previous period (Nascimento-e-Silva, 2012).

The application of this method allowed a) to delimit the conceptual scope of the research protocols, b) to identify the essential elements of the research protocols and c) to understand what are the steps for the elaboration of a research protocol. Through this construct, it appeared that the logic of execution of this methodological document is of the procedural type (Albuquerque, Morais, Lima, & Nascimento-e-Silva, 2018; Brito, Nascimento-e-Silva, Sores, & Soares, 2016; Silva, Oliveira, Sá Filho, & Nascimento-e-Silva, 2019), in which each step described in the protocol must be followed to ensure that the final objective of the research is reached in an unchallenged manner. The study demonstrated that the protocols should not be confused with research questionnaires, which have other techniques of implementation and their application is recommended for other purposes, more precisely in studies that seek to evidence the opinion of a certain population regarding the theme worked by researcher.

3. Results and Discussion

Here, the results obtained during the research process will be presented. It is organized into three subtopics. The first of them brings the conceptual scope of the research protocols. The second describes the elements that make up the research protocols, while the third details the stages of elaboration that the researcher must go through in order to formulate the methodological instrument highlighted in this textual construction in an assertive and efficient way.

3.1 Definition of research protocol

The research protocol consists of a document whose content must highlight all stages of the investigative process (Fontelles et al., 2009). This concept points out that the research protocol can serve as a requirement for financial resources and can also act as a guide, which describes in a procedural way the steps to be taken by the scientist in the course of his research. Protocols are formal descriptive records whose applicability occurs in research processes in several areas of knowledge, among which clinical research stands out (Kumar & Joshna, 2019).

A protocol is a document of a descriptive character that must display the following information: a) background, b) justification, c) objectives, d) study design, which in the definition of the authors is described as design, e) methodology, f) considerations statistics and g) organization of the research project (Kumar & Joshna, 2019). As can be seen, the range of information present in a protocol goes beyond a set of semi-structured questions, which is the format of most research questionnaires. It is worth highlighting the sequential character of each piece of information, which refers to a process composed of a logical sequence of steps that, when correctly performed, will generate a certain result (Albuquerque et al., 2018; Brito et al., 2016).

A research protocol is only considered valid if the study design has as its main purpose the answer to a certain research question (Binik & Hey, 2019). This statement is consistent with the studies by Nascimento-e-Silva (2012; 2019), which say that the first step for a research to be considered scientific is the search for answers that can answer unequivocally to a guiding question of research (Brei et al., 2014). This question can also be called a problem (Lukosevicius, 2018), which lacks a solution to be proposed by the researcher. That is why Peterson, Tagliazucchi and Weijer (2019) warn that a research protocol that is considered invalid would not be consistent enough to justify its realization for the study participants, even though the topic discussed in the investigation is considered relevant.

It is emphasized that the research protocol is a document whose content should elucidate the background and the reasons for the materialization of a study (Martín et al., 2019). These items that must be detailed in the textual body of the protocol, which, according to Martín et al. (2019), are the objectives, the study design, materials and methods used during the research, interpretation and analysis of the data obtained during scientific research. The authors report that it is important that the protocol explains in detail how the data will be collected and that the analysis of the set of information obtained is done with a focus on the search for the answer to the guiding question (Brei et al., 2014) or resolution of the problem (Lukosevicius, 2018) identified by the researcher.

In addition to the aspects already mentioned, the research protocol can be understood as a proficient tool in terms of ensuring a better connection between the scientist and his interviewees (Poncet et al., 2019). Another benefit pointed out by Poncet et al. (2019) is that the research protocol makes studies more viable and accepted by the researched population, since this instrument aims to ensure transparency (Capocasa & Volpi, 2019; Ketokivi & Choi, 2014) in carrying out scientific studies. This connection is important since without it the researcher does not obtain the necessary success in his investigation due to the lack of

feedback from the respondents due to their lack of interest in collaborating with the research. It is in this sense that the research protocol can be considered an assertive methodological instrument, which effectively collaborates with the achievement of the objectives initially defined by the researcher during his investigation.

The research protocols are methodological records necessary for scientific studies to be characterized by impartiality in their conduct (Raslan & Calazans, 2014). The term impartiality suggests the researcher's free character, who must portray in a reliable way the behaviors of the observed phenomenon or the main aspects of the studied context. With this information in mind, it appears that the protocol is intended to delimit the researcher's field of action, in addition to establishing the appropriate congruence between the research objectives initially defined and the results from the investigative practice.

In addition to being an applicable instrument for scientific research, the protocols also have a legal and normative character (Siquelli & Hayashi, 2015). This scientific record must accurately describe each dimension corresponding to each study participant. This is necessary to obtain the necessary authorizations from the Ethical Research Councils, for example. In research involving human beings, it is necessary to submit, both the protocol and other documents requested in Plataforma Brasil, so that the investigative process is properly authorized (CNS, 2016), unless the study falls under the exceptions exempt from the execution of this procedure.

Research protocols are instruments to assist the scientist, which can be applied in the action-research modality (Mello, Turrioni, Xavier, & Campos 2012). The recommendation of adopting the protocol aims to ensure more reliability and transparency to the investigative process (Capocasa & Volpi, 2019; Ketokivi & Choi, 2014). This point of view is in line with the conception of Nascimento-e-Silva (2012), in which the scientific method differs from other types of research in that it is precise, logical, rational and reliable. The use of the research protocol in investigative studies can be considered as an essential and mandatory topic to be observed by researchers during their scientific discoveries.

Research protocols are an elementary mechanism in conducting research in the clinical field. The relevance of the protocol is related to the description of all stages of the current study (Luna, 1998; Oliveira, 2016). The detailing of the research methods employed to unequivocally meet the research objectives is a main aspect related to this record. This demonstrates that the research protocol can be understood as a methodological strategy that, if well used, maximizes the probability of reaching the researcher's objectives in his scientific works.

The protocol increases the reliability of the study with regard to the issue of data collection and analysis, which, in turn, increases the reliability of the results obtained in scientific studies (Yin, 2015). In this concept, the term “mental agenda” is attributed to the protocol, which suggests that this methodological tool works as a manual, whose function is to guide the investigative practice of the scientist in search of answers that will assist him in understanding and solving the question of research (Nascimento-e-Silva, 2012) initially defined in the research process. It appears that the research protocol is a kind of script that can help the researcher in choosing the most appropriate research strategies to enable the answer to the guiding question or the resolution of the problem focused on his study (Brei et al., 2014; Lukosevicius, 2018).

The research protocol can be understood as the methodological instrument of documentary and descriptive nature, whose content must contain the steps that will compose the entire investigative process to provide more reliability to the researcher's work. The term protocol itself suggests the idea of formality, which, in other words, indicates that for its execution there are good practices and procedures that must be observed and put into practice. The protocol should be noted for being systematic and precise, and its practice within the standards recommended by science increases the probability that the scientist will consistently and accurately address the guiding question or research problem that permeates his investigative process.

3.2 Elements of research protocols

The research protocols follow a procedural logic, which in other words means that the researcher when successfully completing each phase will inevitably reach a result (Albuquerque et al., 2018; Brito et al., 2016; Silva et al., 2019). Here the mandatory elements that a research protocol must present will be presented. The first research protocol model found is in the study by Lousana (2008). Here, a protocol must consist of the following items: a) description of what will be investigated, b) information from the research subjects, c) qualification of the researchers and d) the responsible bodies. In this conceptualization there is a procedural aspect (Albuquerque et al., 2018; Brito et al., 2016; Silva et al., 2019), whose logic of execution will make the investigator reach a certain end. It can be concluded that the research protocol consists of a document divided into parts that, when written, describe in detail the steps taken during scientific investigation.

Another protocol proposal is present in the research undertaken by Fontelles et al. (2009). The structural topics of this research protocol model are a) decision, b) execution, c) analysis and d) writing. The decision considers the choice of theme; problem formulation; justification; literary review and objectives. The execution is formed by the elaboration of the research project and data collection, while the analysis includes the tabulation and analysis of the data obtained by the author followed by its presentation and discussion. The essay covers the written part and the exhibition of the academic production resulting from the research. The link between these parts reinforces the systematic aspect of the protocols, which corroborates the precise and methodical character that characterizes scientific investigations.

The third structure of research protocols was found in the studies by Yin (2003) and Consoli, Musetti, Scare and Fratantonio (2008). These authors point out that the research protocol has greater execution complexity than the questionnaires and should consist of the following topics: a) a summary of the project; b) field procedures, which involve the presentation of the researcher, the research sites and the sources of information; c) specific study questions, such as tables or lists of information, and; d) a report concerning the case study, which includes both the format and the presentation of the data and the references used. It is observed that the research protocol consists of an instrument whose execution requires more time than the design and application of a questionnaire (Yin, 2003; Consoli et al., 2008), not only because of its magnitude, but also because be considered a guide in which all the steps taken by the researcher in his scientific process must be properly recorded.

The logic of using four main steps to structure the research protocols is also present in Yin (2005) and Alatrakschi et al. (2018). In the interpretation of these authors, the research protocol should consist of four topics: a) an overview of the research carried out; b) the data collection instruments used in the course of the investigation; c) the questions used in the study, and; d) the final report, the content of which shows the data to be analyzed. In addition to this description, Alatrakschi et al. (2018) reinforce that the adoption of research protocols in scientific processes can increase the reliability and transparency of the work developed by the researcher in his field of activity (Capocasa & Volpi, 2019; Ketokivi & Choi, 2014).

The systematization of the construction of research protocols in four phases is also present in Martins et al. (2014). According to the model proposed by these authors, the necessary steps to build an effective research protocol are a) a synthesized view of the study, b) the field procedures, with details of the data collection strategies in the units of analysis, c) the questions formulated in the study and d) the general research report with the data obtained. It appears that the process of making research protocols is composed of a) an

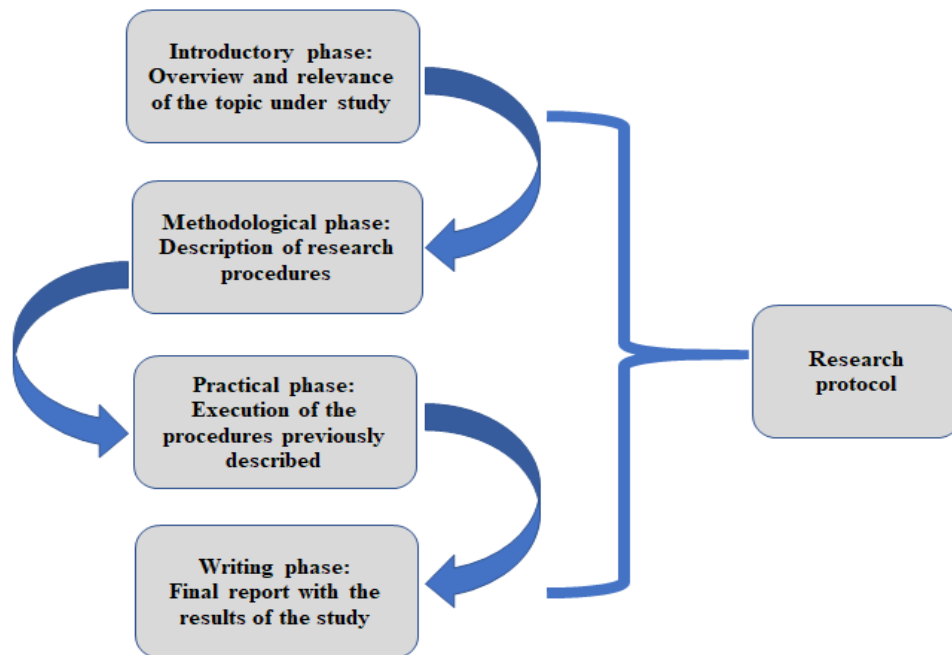
introductory phase, which should provide a general overview of the theme to be worked on b) methodological phase, in which the necessary procedures are described to collect the data that will substantiate the study, c) practical phase, in which the procedures previously described are performed in the research field and d) writing stage, in which the results obtained are described in detail by the researcher.

If the scientist chooses to include more information in his research protocol, a model to be followed to fulfill this purpose is presented by Luna (1998) and Oliveira (2016). These authors point to a more detailed view of the protocol compared to the other concepts explained so far. According to this interpretation, a research protocol must contain in its structure a) relevance of the topic under study, b) literature review, c) the research question, d) the selection of the sample with the description of the steps for its definition, and) strategies for conducting the research, f) analysis of the data collected, g) administrative responsibilities and h) ethical considerations.

With this information, it is inferred that it is up to the researcher to decide, based on the characteristics of his investigation, which research protocol pattern is best suited to the proposed objectives. It is considered that scientific processes that are richer in details, such as, for example, clinical research, require the adoption of more robust protocols. The realization of theoretical-empirical research, whose execution logic is simpler, the models composed of four main stages is the most adequate to enable the full achievement of the research objectives intended in an investigation. Figure 2 shows the research protocol model formed by four phases, which is the type of structure that was most frequent during the steps that make up this methodological instrument.

Figure 2 summarizes the results obtained for the part of this study that sought to know the elements that must structure a research protocol. The introductory part aims to promote an overview of the research, with emphasis on the magnitude of the theme to be worked on by the researcher. The methodological part can also be referred to as the procedural phase, in which the scientist must detail which strategies and instruments will be used to collect data from his study. The practical phase represents the execution of what was defined in the previous stage of the research protocol. The editorial part concerns the description of the results obtained during the research.

Figure 2. Structural elements of the research protocols.



Source: Data obtained by the authors.

This chain between the structuring parties shows that the execution of the research protocols demonstrates that the main aspect is that of systematization (Alconero-Camarero & Íbanez-Remanteraía, 2017).

3.3 Stages of elaboration of research protocols

The introductory part of a research protocol needs to demonstrate objectively the general view of the theme to be worked on during the study. This panorama should include: a) the central theme of the research; b) objectives; c) relevance of the chosen theme; d) the research problem; e) justification of the study, and; f) guiding questions of the study (Brei et al., 2014). It can be said that the introductory phase of the elaboration of a research protocol has as main intention to explain what the theme will be worked on during the scientific investigation, as well as the reasons that led to its realization. It is convenient to highlight in this introductory section of the protocols the significance of the questions that will be the guiding thread of the study, since the practice of the scientific process itself consists of formulating questions in order to answer a research problem (Lukosevicius, 2018; Nascimento-e-Silva, 2012; 2019; Nouri & McComas, 2020).

The determination of the objectives will guide all the rest of the execution of the protocol since its execution logic is of the procedural type. In other words, it is necessary that a series of steps are successfully accomplished so that at the end the expected result is generated (Silva et al., 2019). This means that the logic of making a research protocol has in systematization one of its mandatory procedures (Alconero-Camarero & Íbanez-Remanteraía, 2017).

In turn, the procedural part of the protocol should contain the procedures that will be adopted with a view to supplying the research questions previously defined in the introductory stage of production of the protocol. In an analogous view, if in the general view the scientist must explain the objectives intended with the realization of his study, the methodological phase should elucidate the research strategies that will be adopted during the study. It is considered that every objective must be necessarily linked to a strategy, as this is what makes the achievement of the desired goals feasible (Nascimento-e-Silva, 2017).

The methodological step must explain how the researcher intends to collect the data necessary to support his scientific research. This may include conducting interviews, applying questionnaires and meeting with focus groups, for example (Gil, 2010; Prodanov & Freitas, 2013; Pátaro & Calsa, 2020). With the Covid19 pandemic, the use of digital communicational instruments has been a significant alternative for obtaining data in scientific processes (Gama Neto, 2020). Among the tools that can be used in this context, the production of online questionnaires and videoconferences stand out (Ribas, Santos & Trindade, 2019; Ribeiro, Pantoja & Paixão, 2020).

The practical step of the research protocols represents the execution of the procedures defined by the researcher with a view to achieving success in his scientific process. It is worth mentioning that this part of the execution of the protocols requires attention on the part of the investigator, which ranges from the preservation of the respondents' identity to the correct approach with potential study participants. Another relevant aspect is that of ethics in research with humans, which includes obtaining authorization from individuals and legal entities for the collection of data, as well as observing the principles existing in the legislation relevant to this subject (CNS, 2016).

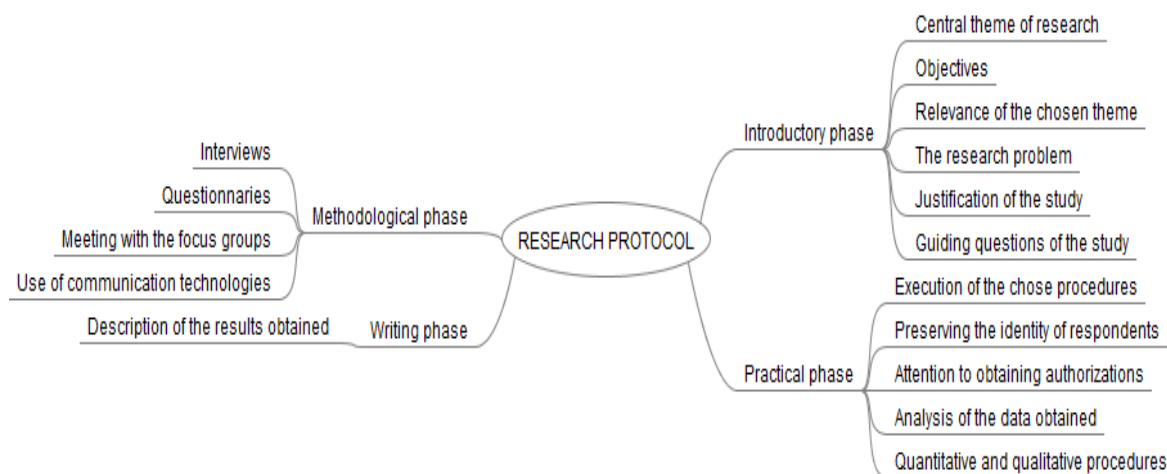
The practical phase of the research protocols also includes the analysis of the information obtained during the data collection process. In short, analyzing means breaking into parts (Nascimento-e-Silva, 2012). In other words, it is understood that the data analysis process represents the exposure of the results obtained, which is carried out with a view to assertive understanding of the problem studied (Lukosevicius, 2018).

The analysis of scientific data can be carried out under three approaches. The first one is of a quantitative nature, which is applicable in cases where the organization of the data is done through tables and graphs whose content is of a numerical character. The option for this approach can occur in cases where the scientist aims to discover the existing correlation between the variables studied (Esperón, 2017).

The second prism of analysis is the qualitative one, which, differently from what is observed in quantitative studies, does not focus its attention on numbers, but on texts. The third is qualitative and quantitative triangulation, where the two previous approaches combine to generate more consistent results than those achieved with their isolated use. It is considered that the researcher's focal point occurs in the discourse of each participant with the clear intention of perceiving their point of view regarding the theme worked by the scientist (Canuto, Bragal, Monteiro, & Melo, 2020).

It is emphasized that the results obtained during the research practice must be exposed consistently, even though the initial objective outlined by the researcher has not been achieved. In a similar view, the presentation and analysis of results in scientific studies corresponds to accountability (Alagrash, Alghayadh, Alshammari, & Debnath 2019), in which the researcher objectively and didactically displays the findings obtained during the execution of his research project. It is considered that the lack of observance of this basic principle compromises the credibility of the study, since its results must be known not only to the scientific community but also to society.

Figure 3. Phases of protocol research with its subitems.



Source: Data obtained by the authors.

The final part of the research protocols is the wording, which corresponds to the detailed description of everything that occurred during the study in written format. It is the record made by the researcher in which all the facts that contributed so that the result reached at the end of the research could be materialized are described. It is appropriate to endorse that the completion of the steps that make up the making of the research protocols must always be based on truth and transparency (Capocasa & Volpi, 2019; Ketokivi & Choi, 2014). This is a commitment that must permeate not only the realization of research protocols, but also all scientific initiatives. Figure 3 summarizes this process.

4. Conclusion

The present study presented, based on the scientific literature contained in the Google Scholar and Science Direct databases, the conceptual scope, the elements and the stages of elaboration of the research protocols. Regarding the conceptual scope, it was inferred that this methodological instrument is of a documentary nature and brings in its content the entire path to be followed by the scientist in the course of his investigation. The systematic nature of the protocols suggests that this record should be used with due regard for the procedural aspects inherent to it.

Concerning the elements that make up the research protocols, the study found that there is no single model for using this instrument. The scientific literature consulted presented several protocol standards, each with a different nomenclature to name each phase that makes up the structure of this document. The similarity between the protocol models identified was due to the number of steps, where most of the investigated works demonstrated the existence of four major steps to be carried out by the researcher.

The most common structure, which was detected in more than one scientific study, was the one that contains the following elements: a) introductory part, which contains an overview of the study; b) the methodological procedures that will be used in the research practice; c) the collection, organization and analysis of the data obtained, and; d) the final report, whose content brings the analysis of the data collected by the researcher.

This refers to the logical procedural scheme, composed of parts that must be executed correctly to produce the expected result. It is noted that as in any process, it is necessary that the first stage is carried out precisely so that at the end the subsequent stage is fulfilled and so on. The expected result with the use of the research protocol is a reliable description of the

steps taken by the scientist in the search for the data that will assist in the analysis of the reality or phenomenon under study.

Despite its recognized relevance and being understood as an instrument that maximizes the reliability of scientific research, the understanding of both the meaning and the topics that structure the research protocols notably needs to be reinforced. It is necessary that further studies are carried out regarding this methodological instrument so that future researchers are aware of the existence of this mechanism, which, if well used, makes the research work more fruitful and aligned with the objectives pursued in the investigative processes.

The realization of this study can be considered a relevant step to encourage new research focused on this theme. This is necessary for the state of the art pertinent to research protocols to be strengthened in the national scientific context, since the total number of productions related to this theme is limited when compared to other research instruments, such as, for example, interviews and the questionnaires. For future studies, it is suggested to produce an article that explains the conceptualization, the structuring topics and the logic of execution of bibliometric studies, as well as its applicability in studies from master's and doctoral research.

References

Alagrash, Y., Alghayadh, F., Alshammari, A., & Debnath, D. Cloud Computing: A Framework for Balancing Accountability and Privacy Based on Multi-Agent System. *Proceedings of Cybersecurity and Cyberforensics Conference (CCC)*, Melbourne, May 8-9, 2019.

Alatrakschi, N. et al. (2018) Políticas de gestão de frotas nas organizações humanitárias: o caso da Organização Internacional de Migração. In: *Annals of V Seminário de Logística Humanitária*. June 21. 2018, Rio de Janeiro, PUC.

Albuquerque, A. S. F., Morais, M. A. S., Lima, M., & Nascimento-e-Silva, D. (2018) Processo de institucionalização: um estudo sobre a experiência do espaço da cidadania ambiental (ECAM). *Review of Research*, 7(9), 1-13.

Alconero-Camarero, A. R., & Íbanez-Rementería, M. I. (2017) Adecuación del método científico en cuidados intensivos: paciente con úlcera terminal de Kennedy. *Enfermería Intensiva*, 28(3), 135-136.

Binik, A., & Hey, S. P. (2019) A framework for assessing scientific in ethical review of clinical research. *Ethics and Human Research*, 41(2), 2-13.

Brei, V. A., Vieira, V. A., & Matos, C. A. (2014) Meta-análise em marketing. *Revista Brasileira de Marketing*, 13(2), 84-97.

Brito, Z. M., Nascimento-e-Silva, D., Soares, M. L., & Soares, M. M. (2016) Processo gerencial: uma análise para suporte à gestão em uma instituição federal de ensino. *In: Annals of XVI Colóquio Internacional de Gestión Universitaria – CIGU*, November 23-25, Arequipa, Peru.

Canuto, A., Bragal, B., Monteiro, L., & Melo, R. (2020) Aspectos críticos do uso de CAQDAS na pesquisa qualitativa: uma comparação empírica das ferramentas digitais Alceste e Iramuteq. *New Trends in Qualitative Research*, 3, 199-211.

Capocasa, M., & Volpi, L. (2019) The ethics of investigating cultural and genetic diversity of minority groups. *J. Comp. Hum. Biol.*, 70(3), 233-244.

CNS. (2016). *Resolução n° 510, de 7 de abril de 2016*. Brasília: CNS.

Consoli, M. A., Musetti, M. A., Scare, R. F., & Fratantonio, W. A. (2008) Uma discussão sobre a utilização do estudo de casos como método de pesquisa em ciências gerenciais. *In: Annals of XXXII Encontro da Anpad*. September 6-8, 2008, Rio de Janeiro, Brazil.

Esperón, J. M. T. (2017) Pesquisa qualitativa na ciência de Enfermagem. *Esc. Anna Nery*, 1(21), 1-2.

Fontelles, M. J., Simões, M. G., Farias, S. H., & Fontelles, R. G. S. (2009) Metodologia da pesquisa científica: diretrizes para a elaboração de um protocolo de pesquisa. *Rev Par Medicina*, 3(23), 1-9.

Gama Neto, R. B. (2020) Impactos da COVID-19 sobre a economia mundial. *Boletim de Conjuntura*, 2(5), 113-127.

Gil, A. C. (2010) *Como elaborar projetos de pesquisa* (5th ed.). São Paulo: Atlas.

Ketokivi, M., & Choi, T. (2014) Renaissance of case research as a scientific method. *Journal of Operations Management*, 32, 232-240.

Kumar, R. S., & Joshna, B. (2019) Protocol development: a contract between sponsor and investigator. *Journal of Drug Delivery and Therapeutics*, 9(4), 844-845.

Lousana, G. (2008) *Boas práticas clínicas* (2nd.). ed. Rio de Janeiro: Revinter.

Lukosevicius, A. P. (2018) Executar é preciso, planejar não é preciso: proposta de *framework* para projetos de pesquisa. *Administração: Ensino e Pesquisa*, 19(1), 32-65.

Luna, B. (1998) Sequência básica na elaboração de protocolos de pesquisa. *Arquivo Brasileiro de Cardiologia*, 71(6), 735-740.

Martín, S. R., Manjarrés S. M., & Martín S. R. (2019) Aspectos metodológicos de la instrumentalización de la recogida de datos primários y sus consideraciones éticas en la investigación clínica. *Enfermaria em Cardiologia*, 76(17), 21-26.

Martins, R. A., Mello, C. H. P., & Turrioni, J. B. (2014) *Guia para elaboração de monografia e TCC em engenharia de produção*. São Paulo: Atlas.

Mello, C. H. P., Turrioni, J. B., Xavier, A. F., & Campos, D. F. (2012) Pesquisa-ação na engenharia de produção: proposta de estruturação para sua condução. *Produção*, 22(1), 1-13.

Nascimento-e-Silva, D. (2012) *Manual de redação para trabalhos acadêmicos: position paper, ensaios teóricos, artigos científicos, questões discursivas*. São Paulo: Atlas.

Nascimento-e-Silva, D. (2019) *Manual do método científico-tecnológico*. Florianópolis: DNS Editor.

Nascimento-e-Silva, D. (2017) *Gestão de organizações de ciência e tecnologia: ferramentas e procedimentos básicos*. Saarbrücken: Novas Edições Acadêmicas.

Nouri, N., & McComas, W. F. (2019) History of science (HOS) as a vehicle to communicate aspects of nature of science (NOS): multiple cases of HOS instructors' perspectives regarding NOS. *Research in Science Education*, 1-17. DOI: 10.1007/s11165-019-09879-9.

Oliveira M. G. (2016) *A gestão de riscos como uma ferramenta para o sucesso de ensaios clínicos: um estudo de caso*. Dissertação (Mestrado em Gestão, Pesquisa e Desenvolvimento na Indústria Farmacêutica). Fundação Oswaldo Cruz, Rio de Janeiro, Brazil.

Pátaro R. F., & Calsa G. C. (2020) Reflexões sobre a pesquisa com grupos focais nas ciências sociais e humanas: a questão da quantidade de participantes, proveniência e local de organização. *Ciências Sociais Unisinos*, 56(1), 1-12.

Peterson A., Tagliazucchi E., & Weijer C. (2019) The ethics of psychedelic research in disorders of consciousness. *Neuroscience of Consciousness*, 5(1), 1-8.

Poncet, L. et al. (2019) Investigating and improving access to reproductive healthcare for vulnerable migrant women in France: a survey protocol for a mixed-method interventional cohort study. *Social Science Protocols*, 2, 1-13. DOI: 10.7556/ssp.2019.2672.

Prodanov, C. C., & Freitas E. C. (2013) *Metodologia do trabalho científico: métodos e técnicas de pesquisa* (2nd ed.). Novo Hamburgo: Feevale.

Raslan, D. A., & Calazans, A. T. S. (2014) Data warehouse: conceitos e aplicações. *Universitas Gestão e TI*, 4(1), 25-37.

Ribas, T. S., Santos, L., & Trindade, P. (2019) Investigação sobre as formas de descarte doméstico de medicamentos em desuso ou vencidos por meio de questionário online. *In: Annals of XV Semana Científica da Unilassale – SEFIC*. October 25-28 de outubro, Canoas, Brazil.

Ribeiro, R. T. M., Pantoja, L. D. M., & Paixão, G. C. (2020) Biologando sobre saúde no contexto da pandemia da COVID-19 via plataforma de videoconferência. *In: Anais of V Congresso Sobre Tecnologias na Educação (Ctrl + E 2020)*. August 25-28, João Pessoa, Brazil.

Silva, R. O., Oliveira, E. S., Sá Filho, P., & Nascimento-e-Silva D. (2019) O ciclo PDCA como proposta para uma gestão escolar eficiente. *Regae: Rev. Gest. Aval. Educ.*, 8(17), 1-13.

Siquelli, S. A., & Hayashi, M. C. P. I. (2015) Ética em pesquisa de educação: uma leitura a partir da resolução 196/96 com expectativas para a resolução 466/12. *Histórias e Perspectivas*, 52(1), 65-81.

Yin, R. K. (2003) *Applications of case study research* (2nd ed.). Thousand Oaks: Sage.

Yin, R. K. (2005) *Case study: planning and methods* (3rd ed.). Porto Alegre: Bookman.

Yin, R. K. (2015) *Estudo de caso: planejamento e métodos* (5th ed.). Porto Alegre: Bookman.

Percentage of contribution of each author in the manuscript

Ronison Oliveira da Silva - 20%

Júlia Angélica de Oliveira Ataíde Ferreira - 20%

Jose Anglada Rivera – 20%

Silvestre Sales de Souza – 20%

Daniel Nascimento-e-Silva – 20%