

The Development Framework of Research Methodology and Mixed Method (Qualitative and Quantitative) for PhD in Construction Management – Post-Disaster Reconstruction Management Phase.

Samuel Quashie MSc. Env. Civil Eng.¹ and Peter Faell PhD²

¹Instructor, Tarrant County College, Fort Worth, USA

²Professor, University of Bolton, Bolton, U.K.

Corresponding author's E-mail: samuelokai54@aol.com

Abstract

Researching the phenomenon and answering research questions to generate an integrated management system to manage the post-disaster reconstruction phase calls for a well-created or structured framework for the research methodology plus a mixed method. Aim and Purpose: To produce an Integrated Management of Environmental, Occupational Health & Safety and Quality Management Systems, a Disaster Management framework for Post-Disaster Reconstruction Projects Management and Empirically Validate the Framework. Research methodology and mixed methods framework study activities are the following stages: Literature Review, Formulating Research Methodology and Mixed Methods, The Research Aim and Objectives, The Research Question Statements - Mixed Methods (Qualitative and Quantitative), Planning and Procedures for Participants and Service Users' Involvements, Designing of Questionnaires and Surveys Research Question, Using Mixed Method Design Data Collection and Analysis with NVIVO and Final Development of the Integrated Management System for Post-Disaster Construction Management Phase, Recommendation and Conclusion. OBJECTIVES: Explore the awareness and practice of environmental, occupational health, safety, and quality management systems, as well as disaster management practices for the post-disaster reconstruction phase and routine reconstruction. Furthermore, the mixed methods part addresses the research aim and objectives. Then, it facilitates the achievement of the research goals and contribution to the knowledge and development of an integrated management system for the post-disaster reconstruction management phase. The end addresses the significance of the research methodology and mixed methods framework developed.

Keywords: Methodology and Mixed-Method, Qualitative and Quantitative, Ph.D. Construction Management Research, Post-Disaster Reconstruction, NVIVO.

1. INTRODUCTION

The research methodology drives the research to achieve the goal or goals and generate an integrated management system for managing the post-disaster reconstruction phase. This guide guides the researcher, participants, and service users in assembling and assessing data during the research activities. It also contributes to studying the phenomenon and answering the research questions through observations, case studies, and document review. Case studies are generally popular research methods used for business management and social science research is closely related to construction management research methods in the Built Environment. Amaratunga et al. (2002), Daniel et al. (2020) and (Knight & Ruddock, 2008) wrote that construction management is a relatively new field that draws from a wide range of established disciplines in the natural social sciences, engineering, and management. The methodology employed is action research, a collaborative approach that emphasises knowledge transfer between the researcher and the participants and service users. This collaborative nature ensures that everyone's input is valued and contributes to the research process, fostering a sense of inclusion and respect. The research questions, a mix of qualitative and quantitative, non-experimental studies, are divided into two forms: main research questions and subquestions. The central questions and subquestions are qualitative, while the quantitative questions focus on independent and dependent variables. The significance of the study to the development of the

Research PhD methodology and mixed methods illustrates how the researcher would gather and evaluate data in the research activities, interviews, observations, document reviews, and involvement of participants and service users as part of the contribution to knowledge of post-disaster reconstruction phase management in construction industry and related industries. The aim is to demonstrate that using the research methodology and mixed methods design framework as a tool warrants data gathering analysis and using Nvivo software.

1.1. Literature Review

Methodology is prescriptively made up of phases, tasks, aim and objective, qualitative and quantitative methods, techniques, and tools for the study. A combination of qualitative and quantitative methods in a single project could be especially powerful (Wood, 2013) (Research, 2007). The research methodology, methods, aim, objectives, and processes address the research question and facilitate its achievement and foundation to conduct the study. The research methodology consists of special techniques and various procedures implemented to define (drive), choose, process, and analyse data about a subject you've chosen (Pro-Academic-Writers.com, 2020). The research work methodology part/section helps others evaluate a paper's reliability and genuineness. (Pro-Academic-Writers.com, 2020). Case studies are generally popular research methods used for business management and social science research is closely related to construction management research methods in the Built Environment. Amaratunga et al. (2002), Daniel et al. (2020) and (Knight & Ruddock, 2008) wrote that construction management is a relatively new field that draws from a wide range of established disciplines in the natural social sciences, engineering, and management. Furthermore, Researchers within the built environment disciplines have increasingly drawn on a plurality of social methods to enrich their research.

The advantages of the case study method as part of knowledge transfer for the research include data collection and analysis within the context of the phenomenon, integration of qualitative and quantitative data in data analysis, and the ability to capture complexities of real-life situations, using Nvivo to analyse the data, so that the phenomenon can be studied in greater depth in knowledge transfer processes (Dudovskiy, 2018). NVivo assists qualitative researchers with managing and analysing data, which is part of complex research. Interesting NVivo is used by mixed methods researchers to help get a wider picture of the data they're examining. NVivo applied to validate a quantitative survey; also, NVivo could link census data, which has the actual composition and other factors such as percentage and median, then code the data and call upon the quantitative data that goes along with it. Doing the percentage, median, and code is where NVivo showed what it's really powerful for in mixed methods work (Lumivero, 2023). Knowledge transfer (collaborative research) relationships between the researcher, participants, and service users are done as collaborative research to develop a manual and integrated management framework for post-disaster reconstruction phase management, with the principle of neutral benefits to all parties. There are six categories: People, Publications and Events, Collaborative Research, Consultancy, Licensing, and New Businesses. Knowledge transfer (KT) includes a very wide span of activities that support jointly beneficial collaborations between universities, businesses, and the public sector. Knowledge transfer ensures that critical knowledge is passed on and retained within an organisation, team, or community. (Gallemard, 2023) (University of Cambridge, 2009).

The study design, methods, and procedures are as follows: Research Methodology, Data Collection, Qualitative and Quantitative Methods Combined - Non-experimental, Qualitative Research Questions, Questions Quantitative Methods Research and Conclusion.

1.2. Research Methodology

The research methodology is used to drive the research to achieve the goal or goals, contribute to knowledge or increase knowledge, and generate an integrated management system for post-disaster reconstruction phase management, as illustrated in Figure 1. On the right-hand side of the illustration

in Figure 1., are the processes of mixed methods and ethnographic research (ethnography is the study of social interactions, behaviours, and perceptions that occur within groups, teams, organisations, and communities, i.e., construction phase management team on site) (BMJ, 208) The processes are used to address the research aim and objectives, to facilitate the achievement of the research aim and contribution to data collection; data analysis, conclusion and knowledge.

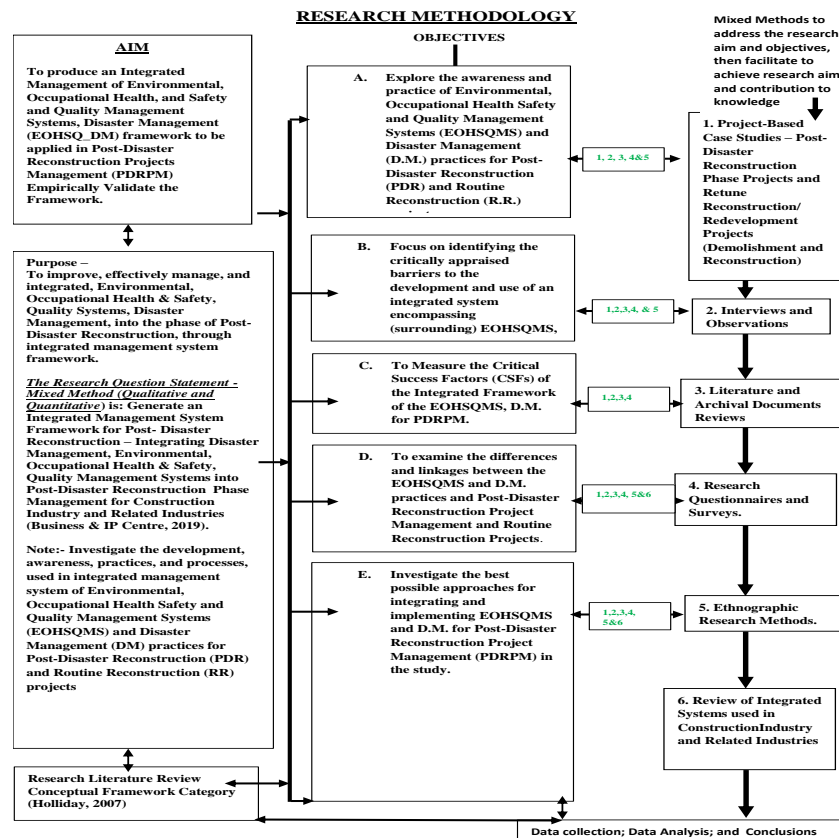


Figure 1. Research Methodology and Methods

The numbers 1 – 6 content, i.e. 6. A review of Integrated Systems used in the Construction Industry and Related Industries would make the mixed-method undertaking easier and take less time to achieve the objectives during the knowledge transfer processes such as case studies, observations, and reviews, as any of the six methods would also be able to contribute objectives areas for data collection, data analysis, and conclusions. This statement means the research methodology, mixed methods, aim, objectives, and processes address the research questions and facilitate its achievement and foundation to conduct the study. The research methodology consists of special techniques and various procedures implemented to define (drive), choose, process, and analyse data about a subject selected. The research mixed-methods approach in the methodology is used to determine the research question and establish a more in-depth understanding of it to solve the problem and generate an integrated management system framework for post-disaster reconstruction. Research mixed methods are made up of two types: qualitative research method and quantitative research method. The qualitative research method is designed to reveal the observable facts, insight into the research case studies, etc., under investigation. A quantitative research method is a systematic approach used to collect quantifiable data by performing computational, mathematical, or statistical techniques for the phenomena under study. Collected data from the qualitative research method would be descriptive, and it is easy to draw inferences from it. On the other hand, data collected through the quantitative research method would be numerical (Bhasin, 2019). The selected mixed-method (qualitative and quantitative) is a qualitative-driven mixed-method design, descriptive theoretical, with the core component being inductive. Morse & Niehaus (2011), in a review of their textbook, *Mixed Method Design: Principles and Procedures*, define mixed methods as combining one or more methodological approaches or practices. The benefit of the mixed methods here, with this research, is that the second method drawn from a

single research study is used to access some parts of the phenomenon of interest that cannot be accessed by using the first method alone. The research overall drives discovery exploration as a means for contributing to knowledge or finding something out, which helps develop an integrated management tool for post-disaster reconstruction phase management. Construction management research is part of business management; it follows and uses management consultancy and management research skills. As Lancaster (2005) explained, students need to understand the main approaches to researching this area and know data collection and analysis techniques. (Lancaster, 2005) again suggested using and applying management research's main strategies to real-world management issues and problems centred on a consultancy type of project rather than management research. The study generates an integrated management system centred on a management consultancy research approach to real-life management problems in post-disaster reconstruction phase management.

1.3. Data Collection

The research methodology consists of special techniques and mixed methods, the steps which are in Figure 1. These are as follows: 1. Project-Based Case Studies – Post-Disaster Reconstruction Phase Projects and Retune Reconstruction/ Redevelopment Projects (Demolishment and Reconstruction), 2. Interviews and Observations, 3. Literature and Archival Documents Reviews, 4. Research Questionnaires and Surveys, 5. Ethnographic Research Methods, 6. Review of Integrated systems used in the Construction Industry and Related Industries and various procedures implemented to define (drive), choose, process, and analyse data about a subject selected. The data collection is through a knowledge transfer relationship between the researcher, participants, and service users, and it is collaborative research. Collaborative research is a powerful means of creating opportunities for innovative knowledge exchange that brings together university research, industry secondments, business acumen, and manufacturing expertise to help those with exploitable concepts achieve commercial success (University of Cambridge, 2009). There would be two sets of questions, as described below, for data collection purposes: the first pinpoint knowledge to be transferred questions. Here, the participants' and service users' competencies, capabilities, and understanding will be represented, which will assist in the study's undertaking. The pinpointing of what knowledge-sharing topics need to be transferred forms part of the initial questions for participants and service users. Here, participants and service users competencies, capabilities, and understanding will be represented, which will assist in the study's undertaking (Gallemard, 2023). That is PART ONE - INITIAL QUESTIONS FOR PARTICIPANTS AND SERVICE USERS (GENERAL QUESTIONS). PART TWO – FINAL QUESTIONS FOR PARTICIPANTS AND SERVICE USERS (DEVELOPMENT OF MANUAL AND INTEGRATED MANAGEMENT SYSTEM FOR POST-DISASTER RECONSTRUCTION DEVELOPMENT).

1.4. Qualitative and Quantitative Methods Combined - Non-experimental.

The mixed method research questions study comprises two forms: the main research questions and subquestions. The central questions and subquestions are qualitative, and the quantitative questions are independent and dependent variables, as illustrated in Figure. 2. The mixed quantitative research question would inquire about relationships among variables in the research that pursue the creation of an integrated management system. As Creswell (2009) emphasised, qualitative research questions assume two forms of central question and associated subquestions, and quantitative research questions inquire about the relationship between independent and dependent variables that the researcher seeks to know. Teddlie & Tashakkori (2009) went further to say qualitative (Qual.) research usually emphasises complicated understanding phenomena (integrated management system formation and usage) as a reason for conducting research, and quantitative (Quan.) tends to emphasise the specification of the relationship among variables. Mixed methodologists embrace all these reasons for conducting the research.

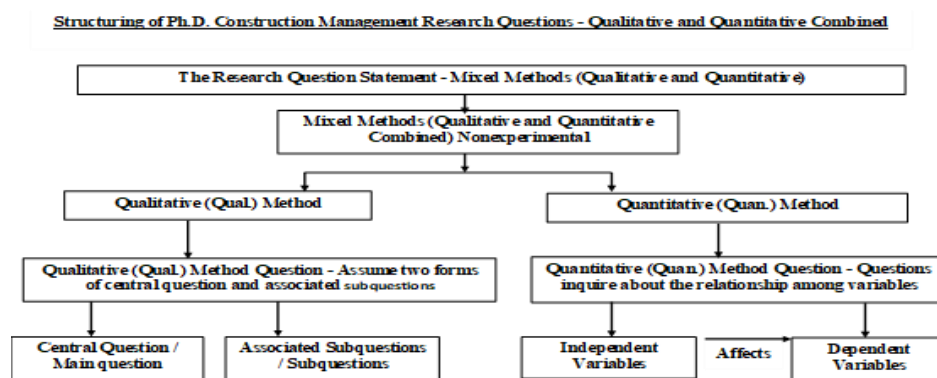


Figure 2. Research Question – Mixed Methods Question - Qualitative and Quantitative Combined Non-experimental Research

Figure 2 illustrates the combined qualitative and quantitative research. The research question is non-experimental research. The qualitative method asks one or two central questions, followed by more than two questions, i.e., five to seven associated subquestions or subquestions. Then, as pinpointed and confirmed by Creswell (2009), ask the central question(s) and follow each general central question with subquestions that narrow the study's focus but open the questioning. Besides that, Creswell (2009) stated that this method is within the parameters set by Miles and Huberman (1994), 'Miles and Huberman (1994) recommended that researchers write no more than a dozen qualitative research questions in all (central and subquestions)'. The quantitative method inquires into independent and dependent variables. The variable is either a result of some force or the force that causes a change in another variable, as illustrated in Figure 3. The researcher manipulates, and participants or service users in the study response rest on the manipulation. The variable is a characteristic or attribute of an individual or an organisation, such as in the reconstruction phase management. That can be measured or observed and varies among the studied people or organisations (Creswell, 2009).

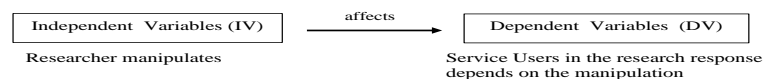


Figure. 3 Independent and Dependent Variables The investigator manipulates, and participants and service users respond depending on the manipulation. Adopted from (Integrity, n.d.).

The research questions for the study or the research are non-experimental research, as illustrated in Fig.4, that would use existing independent variables to create an integrated management system for knowledge transfer. Thomas (2020) wrote that researchers must find already-existing examples of the independent variable and investigate how changes in this variable affect the dependent variable. Furthermore, research outside of an experimental setting often needs help to directly manipulate or change the independent variable they are interested in (Thomas, 2020).

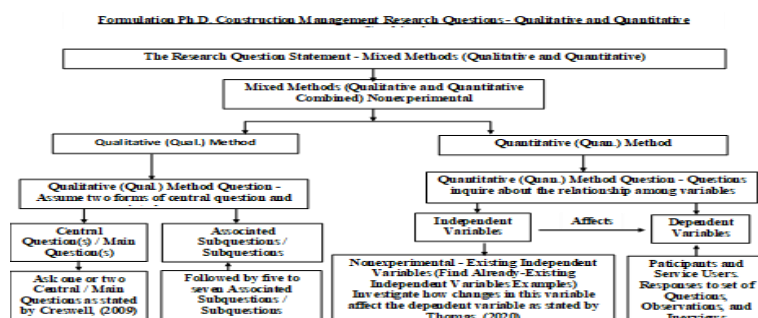


Figure 4. Research Question – Mixed Methods Question - Qualitative and Quantitative Combined – Non-experimental Research

1.5. Qualitative Research Questions

The qualitative research question would inquire into descriptions, observations, and interpretations. Besides, phenomena or variables are measured in descriptions, observations, and interpretations in qualitative questions. The qualitative research questions seek to discover the following: How do participants and service users verbally describe the phenomenon under investigation? How do researchers observe the phenomenon being under investigation? How do we integrate the interpretation of participants' descriptions and the researcher's observations? The qualitative research question seeks to explain the above process by relying on written and verbal descriptions of the process by participants and service users in the construction industry and related industries who undertake the studies Morgan, (1998) and Morse & Niehaus, (2009). Figure. 5 illustrates the layout for the qualitative method questions, central questions (broad questions), and associated subquestions or subquestions (detailed questions); also, subquestions are used for the interview observation and document research method. Qualitative method questions would be one or two central questions and five/seven, or ten questions associated with subquestions. Central questions would ask general questions and then subdivide the central question into subquestions into more specific topical questions. Subquestions would be used during interviews, observing, or looking at documents as part of the studies to develop an integrated management system for post-disaster reconstruction (Creswell, 2009) (Davies & Dodd, 2002).

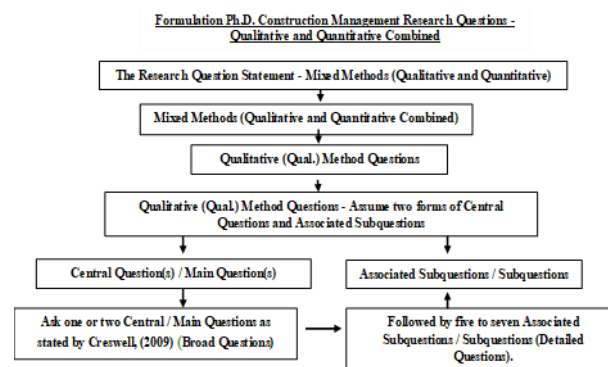


Figure 5. Research Question – Mixed Methods Question - Qualitative Questions – Non-Experimental Research

1.6. Questions Quantitative Methods Research

The quantitative research questions would inquire into phenomena and variables. The quantitative research questions will measure phenomena or variables. The quantitative research question seeks to discover the following: Service users (participants) answer research survey questionnaires about phenomena/variables being investigated. Then, the relationships between at least two phenomena or variables (i.e., case studies) are measured. Explore the differences between service users' (participants) case studies and two or more assessments on phenomena (Morgan, 1998) and (Morse & Niehaus, 2009). The quantitative research question will identify the samples to be explored; most importantly, the survey questions' structure will use the same language for these elements as the research question or problem (the research questions need to cover all three items). The quantitative question above is to verify post-disaster reconstruction and integrated construction management practice and prediction. These predictions are based on the existing literature and should be entirely consistent with the research question/problem sought to discover. Figure. 6 illustrates the layout for the quantitative method questions non-experimental existing independent variables and dependent variables and dependent variables service users/participants' responses to the questions, observations, and interviews.

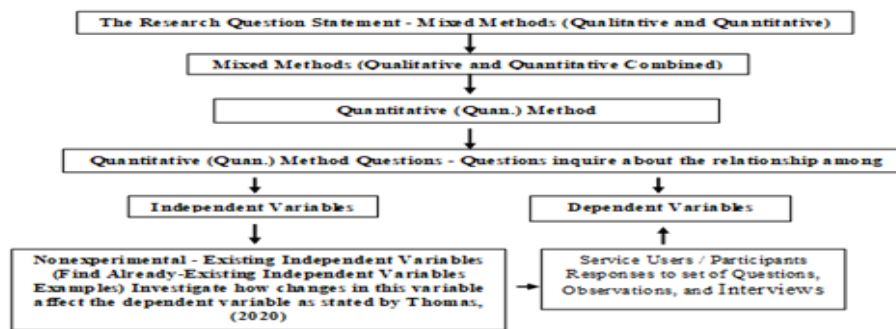


Figure 6. Research Quantitative Questions – Non-Experimental Research

Research data analysis - Nvivo will be used and applied to the research data analysis. The NVivo software program is designed for qualitative and mixed-methods research; Nvivo is used for the analysis of unstructured text, audio, video, and image data, including (but not limited to) interviews, focus groups, surveys, social media, and journal articles. It is available for both Windows and Macintosh operating systems (Kent State University, n.d.) Furthermore, other means, such as Likert scales, would also be applied. Likert scales are a structured way for researchers to gather diverse opinions and attitudes, which would allow the research participants and service users respondents to express their agreement, disagreement, or neutrality concerning statements or questions as part of the knowledge transfer processes, Rensis Likert, these scales are widely used in disciplines such as psychology, sociology, and market research to quantify qualitative data effectively. The model for the interpretation of data, computation, and analysis uses NVivo mixed data analysis. The NVIVO is a powerful tool for qualitative and mixed methods research, and a community of researchers that spans the globe uses NVIVO; using NVivo for Research Methodology and Mixed Methods – Qualitative and Quantitative is illustrated in Table 1.

Table 1. Using NVIVO for Research Methodology and Mixed Method

Using NVIVO for Research Methodology and Mixed Method	
Area of Methods	NVivo Using Examples (Elliott, 2022)
1. Ethnographic research is the product of multiple practices?	Coding, analysing, and writing. NVivo Assist mixed-methods research
2. In qualitative content analysis, open-ended and closed-ended questions and fixed-choice questions.	NVivo analyses the responses to open-ended questions in surveys. Assist mixed-methods research
3. Visual Tools.	NVivo has historical documents available.
4. Review of literature review to analysis of coded data.	Facilitate mixed-methods research.
5. Analysing Documents.	Research design in urban development.
6. Research identifying frames in discourse analysis.	Coding and evaluating speeches and media samples with NVivo
7. Summary features.	NVivo is used to code the whole text of the response that contains the word of interest.
8. Documentary analysis.	NVivo is used to code the whole text of the response that contains the word of interest.
9. Service users and participants are involved in the research surveys.	NVivo analyses the responses to open-ended questions in surveys.

Conclusion

The research methodology drives the research to achieve the goal or goals that contribute to knowledge or knowledge transfer. Its processes assist in addressing the research aim and objectives to facilitate the achievement of the research aim and contribution to data collection, data analysis, conclusion and transfer of knowledge. Numbers 1 – 6 contents in research methodology framework, i.e. 6. A review of Integrated Systems used in the Construction Industry and Related Industries would make the mixed-method undertaking easier and take less time to achieve the objectives during the knowledge transfer. The mixed-methods approach in the methodology is used to define the research question and establish a more in-depth understanding of it to solve the problem and generate an integrated management system framework for post-disaster reconstruction. The mixed method research questions study comprises two forms: the main research questions and subquestions. The

central questions and subquestions are qualitative and quantitative, independent and dependent variables, and they inquire about relationships among variables in the research that pursue the collection of data and the creation of an integrated management system. NVivo software is designed for qualitative and mixed-methods research for the analysis of unstructured text, audio, video, and image data, including (but not limited to) interviews, focus groups, surveys, social media, and journal articles; great for the study.

2. REFERENCES

- Bhasin , H. (2019). *Marketing 91*. Retrieved March 6, 2020, from <https://www.marketing91.com/research-method-and-research-methodology/>
- BMJ. (2018). *Qualitative research methodologies: ethnography*. Retrieved April 8, 2021, from <https://www.bmj.com/content/337/bmj.a1020>
- Dudovskiy, J. (2018). *The Ultimate Guide to Writing a Dissertation in Buiness Studies: A Step - Step Assistance*. research-methodology.net.
- Gallemard, J. (2023). *Smart Tribune*. Retrieved March 10, 2023, from <https://blog.smart-tribune.com/en/knowledge-transfer>
- Kent State University. (n.d.). *University Libraries*. Retrieved March 8, 2023, from <https://libguides.library.kent.edu/statconsulting/NVivo#:~:text=NVivo%20is%20a%20software%20program%20used%20for%20qualitative,It%20is%20produced%20by%20Lumivero%20%28formerly%20QSR%20International%29.>
- Knight, A., & Ruddock, L. (2008). *Advanced Research Methods in the Built Environment*. Chichester, West Sussex: Blackwell Publishing Ltd.
- Lumivero. (2023). *NVivo in mixed-methods research*. Retrieved March 3, 2023, from <https://lumivero.com/resources/case-studies/nvivo-in-mixed-methods-research/>
- Pro-Academic-Writers.com. (2020). *How to Create a Successful Research Methodology*. Retrieved November 21, 2020, from <https://pro-academic-writers.com/blog/how-to-write-research-methodology>
- Research, A. f. (2007). *Using Mixed Methods in Institutional Research*. Tallahasee: Association for Institutional Research.
- University of Cambridge. (2009). *Research*. Retrieved September 7, 2020, from <https://www.cam.ac.uk/research/news/what-is-knowledge-transfer>
- Wood, M. (2013). *Project Management.Com*. Retrieved March 20, 2017, from <https://www.projectmanagement.com/articles/278600/Why-Youre-Confusing-Frameworks-with-Methodologies>