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Simplified Research Methods

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SIMPLIFIED RESEARCH METHODS

WITH EXERCISES & EXAMPLES

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About the Book

This unique collection of ten chapters gives you the essential knowledge for research methods and academic writing. Educational researchers should use this book as a dissertation/thesis writing guide. This book is carefully considering the benefits for both the native and non-native speakers of English. Therefore, understandable and simplified English terms are adopted in writing this book.

This book aims to provide simplified research methods and tools and techniques to dissertation writers. This book is not a discipline-specific resource. Therefore, this resource can equip bachelors/masters and doctorate level researchers with the tools and techniques that are essential for research and academic writing.

A successful research project needs critical planning. Research planning may take some time, but that makes your research journey stress-free. Many students fail to manage the research project due to the lack of research planning. A substantial amount of research fails due to the lack of understanding of the research methodology. Consequently, it fails to produce a merit or distinction level research.

Well-Planned research saves time to focus on the main content such as investigating literature, research methodology, collecting data, analysing data and logically draw conclusions and recommendations. A research project has a time-limit. Therefore, in this book, we have discussed several tools that help you to plan and manage your thesis.

Through this guide, you will be able to employ a critical thinking approach to your research content and structure. This guide consists of several examples and activities of academic writing, which provides you with a starting point to write each chapter of your dissertation and its sections and sub-sections. The content of this guide is kept generic that can be used with citation.

This unique collection of your nuts and bolts for research and academic writing is organised in ten chapters. So, you can use it in a flow-through chapter-by-chapter and section-by-section.

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CONTENTS

List of Figures

List of Tables

CHAPTER 1

INTRODUCTION TO RESEARCH METHODS

1.1 Preface

Treat your research as a project for which Planning and Managing are highly valuable. Without careful and efficient planning, a project is liable to failure. Although research planning can be time-consuming, it refines your research process. Many students fail to manage the research project due to the lack of adequate planning. Moreover, a lack of understanding and awareness of the tools available to research and write excellent report results in either weak or failed piece of research. The difficulties arise from the lack of knowledge of the tools to enhance your academic writing, such as formatting and structuring your academic writing. Some of the challenges you may face are;

- Poor skills in selecting and handling the appropriate source material
- Weak analysis, synthesisation and interpretation of the literature review
- Inadequate planning of the research design
- Lack of understanding of data collection and data analysis
- Poor evaluation skills
- Poor academic writing skills
- Poor referencing
- Plagiarism and collusion

Some of the structure-based problems are inconsistency in writing, headline numbers, page numbers, title pages, the clear linkage between chapters, the clear linkage between sections, coherence, citation and the writing of bibliography at the end of the dissertation.
Well-Planned research saves you time to focus on the main content such as critical literature review, defining research methodology, collecting and analysing data, and logically draw conclusions and recommendations.

By studying this document, you will be able to develop the personal and professional skills that are essential for a postgraduate level, such as critical reading, critical thinking and critical writing.

You will be able to:

- Select and critically analyse appropriate sources of information and data.
- Advance your personal and professional knowledge and understanding of research and professional skills.
- Develop advanced analytical competence at the postgraduate level of study.

- Enhance your knowledge through the development and presentation of a coherent research and experimentation proposal that will address open-ended questions associated with new and advancing theory/practice.

1.2 Introduction to Research

This paper sets the opening of the following documents by introducing the basic principles of research. This document presents the research and research methodology. This paper has seven sections:

- Introduction to research
- Inductive and Deductive Approaches
- Qualitative and Quantitative Methods
- Industrial and Academic Research
- Pure and Applied Research
- Conceptual and Empirical research
- Discussion and Conclusion

1.3 Starting your Research Project

This section describes how your research project may be initiated. It begins by describing a methodology for selecting an appropriate topic and then moves on to explain how to write the research proposal, including such issues as aim and objectives and hypothesis. The matters of verification and validity are also discussed.

1.3.1 Critical Literature Review

This section discusses the literature search, beginning with an awareness of the sources of information, through to structuring the literature review and critically appraising the work of others.

1.3.2 Research Methodologies

This section describes the Research Methods/strategies commonly used by researchers at postgraduate level, with emphasis given to action research (Process Observation and Measurement), surveys/questionnaires, interviews and case studies. A short sub-section on sampling is also included.

1.3.3 Data Analysis and Simple Statistical Methods

In this section, an outline of some simple statistical methods/techniques is given, including descriptive statistics, probability distributions, working with confidence intervals, hypothesis testing and correlation and regression analysis.

1.3.4 Evaluation Techniques

This section discusses different evaluation techniques, Qualitative and Quantitative data analysis tools and techniques, writing findings, writing conclusions and writing results and recommendations.

1.3.5 Writing Your Dissertation Proposal

The section describes the structure of the dissertation. It discusses the essential content of each section, including abstract, introductory chapter, literature review, methodology and Empirical work, presentation and analysis of results and conclusions and recommendations. Besides, an article on 'style' is also included.

1.4 Introduction to Research

1.4.1 What is Research?

The Oxford dictionary defines the research as

"A systematic investigation into and study of materials and sources to establish facts and reach new conclusions."

Based on the above definition, research is a systematic process for the investigation to establish facts, offer an analysis, suggest an explanation or posit a theory. It is an attempt to search for knowledge systematically and scientifically. In research, we examine a subject from different points of view. It is the ability to locate and evaluate information. In essence, research is a valuable skill and a learning process for many areas of life. In most situations, someone, having research skills grants you analytical skills.

1.4.2 The Research Process

Research is a dynamic process for which the first stage is an action plan. A carefully designed action plan must be flexible to adopt the following changes as those emerge. Moreover, this plan should be meaningful. Linking problems/issues with theories, previous findings and methods are demanded in a Construction Industry research process. The links should form a logical chain, and that need

adopting as the work establish facts and findings. The research aims to maintain the rational and orderly relationship between the facts and conclusions. A correct approach to research helps to develop robust conclusions and recommendations.

1.4.3 A Systematic Process for Investigation

As aforementioned, research is a project. Research has a particular set of procedures and steps, which a researcher should follow and specific practices in the research process to ensure accurate and excellent results.

I. Establishing Facts

Establishing facts means- searching for a piece of information that exists. Research is a systematic process to develop the scientific and social facts and verify those by adopts qualitative and/or quantitative techniques to discover the facts. Establishing facts opens us to the knowledge of the past and future. However, facts need verification for actual knowledge. Facts shall be drawn up from the theories (literature review) and then verified through adopting qualitative and/or quantitative techniques.

II. Search for Knowledge and Contribution to Knowledge

In simple terms, research is a quest for knowledge to (establish facts) and verify that knowledge to develop and contribute to existing knowledge. Most postgraduate level Academic Research focuses on small contributions to existing knowledge. Research can focus its input in many ways, such as

- contribution to existing theories (while establishing and verifying facts)
- contribution in academia (while contributing to raising substantive awareness to modify and reflect on existing curriculum)
- contribution to the community of practice (while sharing new knowledge originated by research) and
- contribution for policymakers (while contributing to remodelling existing policies).

1.5 Different Point-of-Views/School of Thoughts

A 'school of thought' is a belief/doctrine/philosophy that is accepted authoritatively by a group. For example, the Association of Project Management (APM) is a group that believes that "an efficient project management approach in construction will reduce time and cost of a building project." This is a school of thought of APM. However, some other group such as Lean Thinkers may have a

different view such as, “an effective Lean implementation approach in construction will reduce time and cost of a building project". The third group, Building Information Modelling (BIM) supports a different view that “adopting BIM in construction will reduce time and cost of a building project”. In this example, the primary purpose is to "reduce the time and cost of a building project”. However, based on a different background, belief and knowledge of these groups have chosen different approaches to solve the issue of time and cost of a building project.

There are different types of the school of thoughts such as Positivist, Constructivist, Critical rationalist based on their belief and philosophy.

1.5.1 Positivist School of Thought

The Positivist school of thought expresses that the Observation of objective reality drives the knowledge (Schwartz, 2005). The argument is that the experience is gained from the Observation of reality, thus distinguishing between an observing subject and an observed object (Maier, 2007). A significant aspect of positivism is the division between object and subject. According to (Baets, 2005), positivism considers that knowledge exists independently in an individual, "the knower" who uses it, learn it and transfer it. The positivists believe that social research is about discovering the patterns and regularities in the social world.

For example, you installed a new software called ‘Mendeley’ to use it for referencing and citation. Since you installed ‘Mendeley’, you found that other software ‘Microsoft Word 2013’ is taking too long to open.

So here your theory could be, “Mendeley interrupts the functionality of MS Word 2013" As a Positivist, you may think that others would have faced this problem. That means this issue has a pattern and you seek for a solution while finding information from the people who have met this issue.

1.5.2 Constructivist **School of Thought**

Constructivism claims that the construction of knowledge is within the mind, and is thus not objective (Schwartz et al., 2005). Constructivist challenges the notion of objective reality (Maier, 2007). A person develops new insights when exposed to new knowledge. Constructivism implies theory, experiments and collaborative task-based learning and teaching. For example, while reading this document- further information about Research Methods is being exposed to your mind.

Observing and absorbing this new knowledge, you will construct/develop new knowledge within your mind.

1.5.3 Empirical **School of Thought**

Empiricism claims that knowledge can be created mainly from experiences. That means Experiment and Observation create new knowledge rather than theory. Therefore, a researcher should test all hypothesis/theories by the Experiment or Observation (Creswell, 2013).

For example, your hypothesis "Mendeley interrupts the functionality of MS Word 2013" should be tested by Experiment and Observation.

To test the hypothesis, you can Experiment and observe the solution in many ways such as,

- restart computer
- uninstall Mendeley and check if the issue resolved
- reinstall Mendeley and check if the issue resolved
- repair Mendeley installation and check if the issue resolved

The other way is to search for the people who faced the same problem and ask questions or observe the online forums where others have shared the solution to the issue. However, there can be many solutions suggested by others. You may need to Experiment one by one until you find a solution that is most relevant to solve your problem.

1.5.4 Social Constructivist **School of Thought**

Social constructivism means that knowledge is constructed in public or Social-settings. One or more members of a group build a shared reality or knowledge. Social Constructivist views tend to form a challenge for "Positivist" school of thoughts (Schwartz, 2005).

1.5.5 Pragmatist **School of Thought**

Pragmatism is concerned with the local reality of experience. It develops a view that an analysis of lived experience represents or mirror reality. Experience, Observation and Involvement, rather than description or theory, are the tools for prediction, action and problem-solving. That means, if a researcher has a research proposition, that proposition can best be demonstrated and tested in practical applications and the experience of users.

1.6 Research Bias and Ethics

1.6.1 Research Bias

Research bias also called experimenter bias, is a process where the results of the research are influenced by the researcher, to portray a particular outcome. The researcher assumes that perception is accurate or false without evidence. Moreover, when a researcher attempts to dismiss or discourage research efforts to confirm or deny any findings, we get research bias.

1.6.2 Research Ethics

Research ethics is an acceptance of standards of social or professional behaviour. Ethics involves the application of fundamental ethical principles (such as protecting the data, names of respondents and other details) to a variety of topics involving research, including social studies. Unethical research conflicts with ethical norms, such as the protection of research participants, the treatment of research animals, respondent's confidentiality, consent to take part or withdraw from a study or informing participants about the nature of the survey.

Based on the Oxford English Dictionary (2007), Fellows and Liu, (2008, p246-259) define 'ethics' as:

- The science of morals; the department of study concerned with the principles of human duty.
- The moral principles or system of a school of thought.
- The moral principles by which guides a person.
- The rules of conduct recognised in specific associations.
- In the broader sense: The whole field of moral science, including besides Ethics correctly.

1.7 Ethical approval for research at university

Students need moral support for conducting research. Ethical approval is essential for any primary studies. Ethical approval is to ensure that a student has a strategy to follow the principles of ethics such as Beneficence, Responsibility, Integrity, Justice and Respect. It also provides that the design of the proposed research does not harm the rights of participants, and the investigation is carried out in compliance with ethical principles. The main principles of ethics are

Excellence – This means being useful to the people you interact for your research. It seeks to safeguard the welfare and rights of the participants in your study. A researcher is responsible for maintaining a professional interaction will others who are affected by the research.

Cooperation- a researcher, should be faithful and develop a relationship of trust with the participants of research. A researcher must accept appropriate responsibility for their behaviour and serve the best interest within ethical compliance. This principle promotes the open exchange of ideas, Research Methods, data, results. However, it is subject to confidentiality in case of personal and sensitive information.

Honesty- the research should promote accuracy and truthfulness in the research practice, such as data collection and analysis. This principle fosters the avoidance of fraud activities, cheating, stealing and misrepresenting the facts within the study. Such activities must be avoided to maximise benefit and minimise harm to participants.

Integrity- this principle promotes fairness and justice to all persons who can access the benefits from the contribution of the study. Therefore, a researcher should take precautions while seeking the elimination of potential biases and ensure that any limitations should not lead to an unfair practice.

Care, Safety and Respect- This means being kind to the people you interact for your research. It seeks to safeguard the welfare and rights of the participants in your study. A researcher is responsible for maintaining a professional interaction will others who are affected by the research. A researcher should respect the dignity of all individuals with a right to privacy, confidentiality and self-determination. A researcher must be aware of and comply with the culture of individuals. Also, a researcher must promote equality in respect to people with role difference, and eliminate the effect of bias based on factors such as age, gender, race, identity, ethnicity, culture, region, sexual orientation, disability and language, etc.

Accountability- a researcher is accountable to ensure that the study complies with the terms and conditions of the project. The field of study should meet all relevant legal and ethical requirements. The researcher must conduct all research within the legal environment and carefully reduce any potential harm to any participant or stakeholders.

A list of further reading for Research Ethics.

More information about ethical guidance is available from

- https://www.wlv.ac.uk/research/research-policies-procedures--guidelines/ethics-guidance/

The University of Wolverhampton has categorised the ethical categories (0, A and B) based on the level of ethics and hazard is available at:

- https://www.wlv.ac.uk/research/research-policies-procedures--guidelines/ethics-guidance/ethical-categories/

1.8 Inductive and Deductive

Saunders et al. (2009) divided the research logic into two approaches, deductive and inductive. The difference between the two research approaches is that deductive is intended to test theory and inductive to build theory.

An inductive approach is building theory from particular facts to a general conclusion. **Theory building** aims at new perceptions and is process-oriented for rich contextual understanding, and develop the meaning through data analysis.

> **Theories** means- is a concept that is not yet verified. In technical language 'theories' is often synonyms with 'hypotheses'.
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> ---
>
> **Hypothesis** means- a proposed intention to explain certain facts or observations or an opinion based on incomplete evidence.

The deductive approach is testing the theory through a logical and analytical judgement by evidence and prior conclusions. The **theory testing** aims to examine the pre-developed (pre-build) theory through data analysis to support the theory through a logical and analytical judgement. However, it does not mean that all theories tested would be right. Theory testing is to establish, is the theory correct or not.

Many types of research consider a qualitative method for theory building and quantitative for theory testing — however, many types of research using both Qualitative and Quantitative Methods for theory building and theory testing. Moreover, research can typically have a mixed approach that incorporates both deductive and inductive. A mixed approach is when a researcher uses both deductive and inductive approaches to research. During qualitative analysis, a researcher often adopts an Inductive Approach to generate theories. Some scholar claims the literature review as a theory-building approach and data analysis (qualitative and/or quantitative) as a theory-testing approach.

For instance,- theory can be built through the literature while reviewing the views of different authors since that theory is based on general conclusions drawn from the literature review that will need testing through logical and analytical evidence. To test the theory, both Qualitative and Quantitative data can be used.

1.9 Qualitative and Quantitative

Perhaps the most crucial classification of Research Methods is the division into Qualitative and Quantitative research (Fellows and Liu, 2008). The main difference in Qualitative and Quantitative

is the type of data. The importance of the classification is because it affects how data are collected and subsequently analysed. However, many scholar views that likewise Inductive and Deductive most researchers use a mixed-methods approach that means a combination of Qualitative and Quantitative.

1.9.1 Qualitative

Qualitative is- "involving comparisons based on qualities". The meaning of 'qualities' here is a characteristic property that defines the nature of something evident. Determining in qualitative is based on the senses or judgement. Qualitative deals with data observed by senses such as sight, taste, smell, touch and hearing. For example- the shape of a football is round- is qualitative data. Anything that does not involve numbers or measurement is considered qualitative. For instance- the radius of the ball is 10 centimetres. This sentence consists of the measurement of a ball. Therefore, it should not be regarded as qualitative data as a football cannot be measured with senses, Observation and judgement.

Qualitative research technique is to find answers to why or how of human behaviour, experience and opinions (Patton, 2005). This technique focuses on words and collects data through different techniques such as interviews, group discussion and observations. This technique adopts unstructured or semi-structured questions that concentrate on the point-of-view of the participant to build a theory. The qualitative method works better in a natural setting (Denscombe, 2007). It is subjective and considers studies, for content, thematic and pattern analysis. This technique is relevant for fewer sample size with open-ended interpretative questions.

A few examples of qualitative data is

- The rose is **red**.
- The tree is **more significant** than the horse.
- The road is **bumpy**.
- The cake smells **flowery**.
- John heard a **bang** behind him.
- Adam was **excited** to tell a story.
- Academic writing is an **essential** skill for students.

Opinion, perception, feelings and attitudes are the foundation of the qualitative approach. A qualitative approach to research is likely to be associated with an Inductive Approach to generating theory. Theory building from qualitative data uses an interpretive model through the existence of multiple subjective perspectives (Greener 2008).

For instance,- you surveyed five construction companies to find what concerns they are experiencing within a building project.

You concluded that four out of five construction companies experienced an issue of building project delays. Based on their experience they expressed that the delay in the building project was due to-

- The late payments.
- The lack of transparency in the documentation.
- The lack of effective communication.
- The late payments.
- No delays.

These five points are qualitative data. Based on those points, you can build a theory. For instance- Delays in building projects is a significant concern for construction companies. Eighty per cent of the construction firms said that the delay in a building project is a considerable concern. Rest 20 per cent experienced no delays. About 40 per cent of the construction firms expressed that the delay occurs due to the late payments. However, 20 per cent said, the delay was due to a lack of transparency in the documentation, and rest 20 per cent concerned that delay in building projects is due to the lack of effective communication.

1.9.2 Quantitative

Qualitative is- expressible as quantity and capable of measurement of quantity. In quantitative- measurement is a process of assigning numbers to a process through the general conscious awareness instead of intuition or reasoning. Quantitative analysis involves numbers and measures. A few examples of quantitative data are

- The temperature is 30° degrees Celsius.
- Adam has 3 T-shirts.
- The average mileage of my car is 52 miles per gallon.

- The capacity of the washing machine is eight litres.
- Forty-five per cent of students fail in a research project due to the lack of adequate planning.

A quantitative approach to research is likely to be associated with a Deductive Approach to testing theory, often using some facts (Fellows and Liu, 2008, 2015). Quantitative research technique is about asking how much or how many (Knight and Ruddock, 2008). That focuses on numbers, not words. Questionnaire surveys are one of the widely used approaches for collecting quantitative data to measure the quantity. Quantitative data focuses on testing a theory that aims to verify the point-of-view of the researcher through accurate statistical analysis (Creswell, 2014). Quantitative is a structured approach to gathering reliable data for generalisation and hypothesis testing (Ahmed et al., 2016). Quantitative is the most consistent, outcome-oriented statistical analysis approach for large sample size.

For instance- You found, "about 40 per cent of the construction firms expressed that the delay occurs due to the late payments". That gives you a theory that "the contribution of the late payments is Very High for delays in building projects". This statement needs measuring to identify general conscious awareness. To measure this statement, you asked below question to Project Managers in building projects.

Question- What is the level of contribution of the late payments that cause a delay in the building projects?

In this question, you are asking Project Managers to represent their understanding of the level of contribution in numbers so that it can be used to measure. There can be many ways to get the answer to this question. This example uses a Likert scale. Likert scale is a scale that is used to capture people's attitude on a topic. In this case, attitude means the understanding of Project Managers. Table 1 below exemplifies the main question, the theory- that needs testing, and the ranking of the Likert scale. The ranking is kept Very Low contribution to Very High contribution. However, the question can be asked in many ways, such as- to measure the agreement, occurrence, importance, etc. that depends on how you want to measure it.

Table 1: Example of Question to Collect Quantitative Data

Main Question	**What is the level of contribution of the late payments that cause a delay in the building projects?**				
Hypothesis/Theory	The contribution of the late payments is **Very High** for delays within the building projects.				
Likert Scale	Very Low	Low	Moderate	High	Very High
Ranking	1	2	3	4	5

Assume- 10 respondents have answered your question. Table 2 represents the answers from those surveyed. The respondents highlighted their solutions in red.

Table 2: Example of Data Collected for Quantitative Analysis

Likert Scale	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
Respondent 1	-	-	-	-	⊙
Respondent 2	-	-	-	⊙	-
Respondent 3	-	-	-	-	⊙
Respondent 4	-	-	⊙	-	-
Respondent 5	⊙	-	-	-	-
Respondent 6	-	-	-	⊙	-
Respondent 7	-	-	-	-	⊙
Respondent 8	-	-	-	-	⊙
Respondent 9	-	-	⊙	-	-
Respondent 10	-	-	-	-	⊙
Total	**1**	**0**	**2**	**2**	**5**

Now, you can test your theory (given in Table 1) through the quantitative data in Table 2 above. In a simple example - the data reveals that five out of ten (50%) respondents expressed that "the contribution of the late payments is **Very High** for delays in building projects". Data proves that your theory is accurate and that can be carried forward for general discuss the general conscious awareness.

1.10 Industrial and Academic Research

Industrial research has a commercial objective. Academic studies in the construction field are mostly independent of industry, although much research carried out in universities is done in collaboration with industry through funding or access to data. Academics are primarily interested in 'know-why' and industry is interested in 'know-how'. Industries and academia use similar methods of research, sometimes with different goals and objectives. Academia often trains researchers for the industry.

1.10.1 Industrial Research

Industrial research is mostly understandably Applied Research/development, sometimes designed to "destroy" competition (Zikmund et al., 2013). The results of competition led research are often not shared with general audience. For example, Apple iPhone does not share research with public that is for developing a new feature. However, universities publish industries funded research with general audiance. Much industrial research is often devoted to areas of a current or short-term future interest of the company, such as research for improving existing technology.

1.10.2 Academic Research

Academic research is often integrated with social science to give a sound fundamental basis to an issue. Academic research develops and nurtures critical thinking skills, a spirit of innovation and entrepreneurship (Zikmund et al., 2013). Academic research focuses on the real applications of theories to an issue or concept. Many but not all Academic Research develops networks of worldwide free sharing and exchange of knowledge.

1.11 Pure/Basic and Applied Research

Applied Research is concerned with fixed problems or data rather than with fundamental principles. However, Applied Research is usually conducted to address a specific business decision for a particular organisation. However, Applied Research mostly considered having an industrial

application. Perhaps Applied Research can be understood as research that deals with practical problems.

Pure Research focused on fundamental principles. The Pure Research aligned with the academic classification of research that has no immediate practical application (Saunders et al., 2009).

1.11.1 Basic/Pure Research

Pure Research is conducted to contribute to current knowledge for the sole purposes of attaining knowledge. Pure Research involves advanced development, testing and authenticating theories that are not within the present and future scenarios. Pure Research seeks results in basic principles relating to a process and explores its relationship to outcomes. Pure Research usually conducted without a specific decision in mind. We can say that Pure Research is an initial stage of research that attempts to expand the limits of knowledge through literature review. Pure Research may not aim to solve a particular problem or issue. It is mainly used to test general theories to find an answer. Some example of basic research questions is

- How can BIM help to mitigate delays in a building project?
- What is the leading cause of delay in a building project?
- How can Project Managers improve project planning?
- Finding answers to these questions does not aim to solve a problem but seeks to find potential solutions to a problem.

1.11.2 Applied Research

An Applied Research "strives to improve our understanding of a problem, with the intent of contributing to the solution of that problem" (Kalra et al., 2013). Applied Research is a systematic and scientific methodology. It helps to generate new knowledge and contribute to the theory. The primary focus of Applied Research is on collecting data for advancing our understanding of real-world problems.

Both pure and applied types of research work better together. For example, a construction firm identifies that the building projects are often delayed and results in soaring cost. The organisation conducted a Pure Research with questions such as, **"what are the reason of delay within a building project?"** Finding an answer to this issue does not provide a solution to mitigate delay in

a building project. It just offers an opportunity to explore the reason for the delay in a building project. However, finding an answer can have different approaches such as literature review to find a generalised view about delays in building projects, conducting a survey within the organisation and with vendors to find the answers.

Once an organisation identifies the reasons for the delay, Applied Research is adopted to find solutions that can deal with those delays. For example- the reason for the delay is **"Lack of communication between contractor and sub-contractors"**.

Now the organisation has a hypothesis that, **Lack of communication between contractor and sub-contractors causes a delay in a building project**. The organisation need to identify ways of improving communication. That means the organisation is now seeking solutions that can be applied to improve communication. Again, finding the answer could have different approaches such as literature review, survey, action research, etc.

1.12 Conceptual and Empirical Research

Conceptual research involves observing a process and formulating an abstract idea based on qualitative information. The Empirical research concludes more factual data, often numeric. Experimentation is commonly used as a technique to yield Empirical evidence and, in this context, embraces more than the physical carrying out of experiments, and may include techniques such as computer simulation and symbolic modelling.

1.12.1 Conceptual Research

Conceptual research is an understanding of something that is built or characterised by the concepts or its formations. In Conceptual studies, it is necessary to understand the subject of research before conducting active research. Developing a hypothesis and testing it needs a solid comprehension of its qualities and principles.

1.12.2 Empirical Research

As mentioned before, Experiment and Observation drive empiricism rather than theory. The central theme in Empirical research is that experiments or observations drive all evidence. The word "Empirical" refers to the testing of working theory/hypothesis adopting Observation and Experiment. Experiment and Observation produce Empirical data.

1.13 Discussion and Conclusion

Research is an investigation, a study of materials to establish facts and reach new conclusions. Research requires searching for knowledge to establish facts and reach new conclusions. However, there are several schools of thoughts such as Positivist, Constructivist, Social Constructivist, Empiricist and Pragmatist, in the viewpoint of research. Those communities have five main views such as Observation, Theories, Experiments, Observation within Social-settings and Observation through Involvement. The views of those communities are compared in the below table.

Table 3: Comparison of Views of Different School of Thoughts

Community	Observation	Theories	Experiment	Social-settings	Involvement
Positivist	✓				
Constructivist	✓	✓	✓		
Social Constructivist	✓			✓	
Empiricist	✓	✘	✓		
Pragmatist	✓				✓

In Table 3 above the visual representation reveals that 'Observation' is the common factor that is required for research, as agreed by all school of thoughts. However, the only Constructivist supports the theoretical view along with Observation and Experiment. Whereas, Social Constructivist view supports that Observation needs a social setting. In some research such as Action or Cultural, Social Constructivist views match with Pragmatist views that Observation requires personal Involvement. In many cases, personal Involvement requires Social-settings, such as observing the lifestyle of a tribal community while living with them. Empiricists views support experiments and Observation but not theory.

1.14 Re-defining Different Views of Research

Observation is an act of observing with careful consideration and recording a measurement. The synonyms of Observation are noticing, reflection and watching. The facts are learned by paying attention to details of something. In a research context, 'Something' could be a literature review, a process, an action done by people. This means that Observation can be used for building theories through literature review, noticing or watching an action or a process, while paying careful attention to a group of people (a group of people is a social setting) or while involved them. Observation is required for

- Qualitative & Quantitative Method
- Inductive and Deductive Approach
- Applied and Pure Research
- Industrial and Academic Research
- Conceptual and Empirical Research

Theories are a tentative insight into the natural world. It is a synonym with 'Hypothesis'. A hypothesis is a phenomenon that needs verification or an original idea that requires evidence to prove its possibility. For instance- a theory is, "*Excessive consumption of Paracetamol can cause cancer.*" However, this theory needs to be established, as this is just a tentative idea.

Once **proven**, it would say, "*Excessive consumption of Paracetamol causes cancer*".

or

If **not proven**, "*Excessive consumption of Paracetamol does NOT cause cancer*".

Theories are built through Observation of process, people or literature review. As said above, in Constructivist views, all methods need testing and evidence to prove or disapprove. Experimentation is the way to test hypotheses. Not every researcher needs to have a theory. However, most research in academia needs theory building (Inductive Approach) and further testing (Deductive Approach) through experimentation (Qualitative and Quantitative Methods). Therefore, a theory may be required for

- Experiments
- Empirical Research (Deductive Approach)
- Pure Research
- Academic Research

A theory is not necessary for Conceptual Research as it is conducted to build a theory.

The Experiment is conducting a controlled test or an investigation of something. Again, in a research context, 'Something' could be a literature review, a process, an action done by people. An Experiment is testing an idea or an effort to do something new or different through observing and measuring. Experiments require a theory so that theory can be tested and evidenced through measurement. An Experiment may be necessary for

- Deductive approach
- Quantitative Method
- Applied Research
- Industrial Research
- Academic Research

Social-settings, in a research context, is researching observing a group of people. Social-settings means that there should be more than one evidence to support a theory. Observing a group of individuals does not mean that research observes more than one person in a closed room. It can be observing individuals through one-to-one interviews through a questionnaire survey. The main idea is to capture the thinking, perception or attitude of a group of people about something, to further measure it to test a theory. Social-settings is required in

- Qualitative & Quantitative Method
- Inductive and Deductive Approach
- Applied and Pure Research
- Industrial and Academic Research
- Conceptual and Empirical Research

In some cases of Social-settings requires the Involvement of the researcher. **Involvement**, in a research context, is that the researcher is observing a group activity while being a part of it rather than sitting idle and watching them. As discussed above, some research, such as action research or research for culture, demands the active Involvement of researcher. Not just this, in a qualitative study researcher, could be actively involved in interviews and express or add his knowledge. However, any Involvement in a research boost researcher's (experimenter's) bias where the influence of researcher is high on the outcome. Experimenter's Involvement can be in

- Qualitative & Quantitative Method
- Inductive and Deductive Approach
- Applied and Pure Research
- Industrial and Academic Research
- Conceptual and Empirical Research

Involvement of researcher in Conceptual Research, Pure Research, Academic Research while building theories that supports Inductive Approach can also influence the outcome in theory building.

In conclusion, Conceptual Research relates to building theories and supports Inductive Approach. Empirical Research supports testing theories through Observation and Experiment and compliments with Deductive Approach.

Therefore, likewise, Inductive & Deductive and Qualitative & Quantitative, there are very few aspects of research in academia that are only Conceptual or only Empirical. Both the Industrial and Applied Research uses Qualitative and Quantitative Methods and consequently, Inductive and Deductive approaches. Moreover, theoretically, Applied Research is a form of an Industrial Research, and Pure Research is a form of Academic Research. However, many of the research, such as industry-funded research in universities, is a combination of Industrial and Pure Research.

The point here is NOT all but most research either it is Conceptual or Empirical, Pure or Industrial, falls into mixed-method that uses Qualitative & Quantitative and consequently uses the blended approach of Inductive & Deductive.

1.15 Activities

Determine whether the following statement is about qualitative or quantitative data: Tick ☑ on the right answer.

1. Diana has £100.	Qualitative	Quantitative
2. The sky is blue.	Qualitative	Quantitative
3. Adam is pleased.	Qualitative	Quantitative
4. 90% of construction firms are SMEs	Qualitative	Quantitative
5. One nine of ten projects fail.	Qualitative	Quantitative

Decide whether below statement is correct ☑ or wrong ☒.

1. Dissertation writing is not a project. ☐
2. Planning a research is not important. ☐
3. It is necessary that all studies should adopt both Qualitative & Quantitative methods. ☐
4. Research is a systematic process to establish the scientific and/or social facts. ☐
5. Industrial research is mostly applied to remain competitive. ☐
6. The industrial research aims to free sharing and exchange of knowledge. ☐
7. The purpose of basic research is to improve understanding of a business problem. ☐
8. Academics undertakes Basic Research. ☐
9. Qualitative research is not a form of basic research. ☐
10. Qualitative research is based on opinion, perception, feelings and attitudes. ☐

Choose one option that is most relevant to the below statement.

Which type of research strives to improve our understanding of a problem, with the intent of contributing to the solution of that problem?

Basic ○ Applied ○ Both ○ None

Which research method is likely to be associated with an Inductive Approach to generating theory?

Quantitative ○ Qualitative ○ Both ○ None

Further reading

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CHAPTER 2

CRITICAL LITERATURE REVIEW

2.1 Preface

A literature review is essential to extend the knowledge about an issue. Through a literature review, you can find out existing information about your field of research. Different type of research, such as Academic Research, Pure research, Conceptual Research demands Literature Review for theory building. In academia, it is highly unlikely that a research topic does not have existing studies. Literature review needs proper planning. Treat this as a process of a dissertation project. The plan includes a choice of primary and secondary research, selection of keywords, inclusion and exclusion of keywords and structure of literature review. Literature review demands skills such as the Critical Reading, Critical Thinking and Critical Writing skills. These skills help in the observation that is an essential factor needed for developing a theory.

This document is drafted to introduce the skills required for a Critical Literature Review. This paper offers an understanding of

- the importance of the source of literature
- the planning of Literature Review
- the use of keywords and Boolean operators, and
- the use of Critical Reading, Critical Thinking and Critical Writing.

Critical Literature Review

2.2 Introduction

Most social research starts with a literature review. A literature review is essential to conduct Conceptual, Pure and Academic Research to build an evidenced theory. A literature review is not just to make a theory but also to support an existing theory. In some cases, such as Industrial or Applied Research, you may have a current theory. Still, the literature review may be necessary to verify the hypothesis. Exploring literature is the very first step for research, even for a different or fresh theory. That is because theory may be new for the researcher, but someone else (in the world) might have already come up with the same or closely matched theory and conducted research. In the modern world, it is highly unusual that there is no research conducted that closely matches your theory. However, the literature on some approaches may be hard to access. But, a document review is necessary to understand the current reality of the theory. Exploring literature provides up-to-date knowledge and understanding to determined how that knowledge is significant to the theory.

2.3 What is a Literature Review?

Literature Review is to look at or examine existing theories of a body of knowledge. The primary purpose of carrying out a literature review is to extend your knowledge and understanding of an issue. Exploring literature is to determine the extent to which the current understanding of the topic has reached. It provides an insight to carry out relevant research. Also, it gives evidence that supports your views on theory and helps to identify any gaps in existing studies. Through Literature Review, a researcher identifies and compares and relates the main ideas to establish similarities and differences of views.

Literature Review is a source of data that help to generate ideas by comparing your thoughts and thinking on existing knowledge. Mainly a review describes the work of others and critically analyses and examine the work of others.

The primary objectives of the literature review are to summarise what is the background of your research field. Providing a research background is vital to establish a solid ground for your research. Furthermore, a researcher builds and evidence the existing knowledge and understanding of the field. Is it essential for a researcher to demonstrate that he/she owns the current awareness of the topic that supports the claims on the research? In academic research, most examiners look for the current understanding of student while pinpointing the areas such as, how clear is student's understanding of the main topic, has student identified and established the relationships or differences of views about the topic and has student used the most relevant sources of literature that provide significant evidence for current understanding.

A literature review is NOT an arrangement of material associated with your research field. It is a critical analysis of all content and drawing your conclusion with against the topic. Also, a literature review is NOT developing a list of books and articles that are read to conclude. It is to critically paraphrasing and summarising the work of others while providing evidence through referencing. A summary of the work of others without evidence (referencing, citation) is not acceptable in a literature review.

2.4 The sources of literature, Primary and Secondary

There is two main sources of information, Primary Sources and Secondary Sources. Here, 'Primary Sources' and 'Secondary Sources' should NOT be mixed with 'Primary Research' and 'Secondary Research'.

2.4.1 Primary Research v Primary Source

Primary Research is a form of field research that frequently involves gathering new data. Surveys using questionnaires or interviews is an example of original research. Primary research is often used for theory testing (deductive) and experimentation that falls into Applied, Academic, Empirical and Industrial Research.

Primary Source is the sources that provide current information about your research field. Primary sources include historical and legal documents, eyewitness accounts, and experiments and statistical data that is published. Moreover, the primary resources are those reports on the original research. Literature review falls into primary sources for Conceptual, Pure and Academic Researches. The primary source of research is the first place to start searching for your idea.

A few examples of primary resources are:

- **Academic refereed journals –** these are useful because they report the results of current research and innovative thinking. Peer review or refereed journal is an academic term for quality control. The experts critically review the articles before publishing in a peer-reviewed journal.

III. **Conference proceedings** – these are similar to academic refereed journals. Conferences are a significant source of innovative research. The construction conferences can help to provide rich data and to obtain constructive feedback on the presented papers. Conferences usually focus on a particular theme. That means, conferences can offer a vast amount of current literature in your field of research, which is topic-centric.

IV. Dissertations/theses – for academic researchers, it is always useful to look at other dissertations/theses, as they give the list of references that can be a good starting point for the collection of literature. Moreover, you can have a feel of expected standard, structure and style of a dissertation. However, not all academic dissertations are excellent. Therefore, looking at a variety of theses will reduce the risk of being trapped with a poorly written dissertation. Asking library staff for help would be a good idea to pick the best dissertations.

V. **Reports/occasional papers –** some organisations may publish reports and occasional papers, which may be a beneficial source of information. In a way, they are similar to refereed academic journals but are usually longer and cover an essential topical subject.

VI. **Government publications –** there is an enormous number of government publications available covering a broad range of topics. Such reports may attain a certain prestige. Some of the central bodies such as HM Revenue and Customs (HMRC), Office of National Statistics (ONS), and Cabinet Office publish up-to-date data and reports.

A full list of government departments is available at https://www.gov.uk/government/organisations.

2.4.2 Secondary Research v Secondary Source

A literature review is a form of a Secondary Research that involves gathering existing data (documentation) that was produced by others. It is also called desk-based research. The secondary resource often adopted to build theory (Inductive) and falls into, Pure and Conceptual Research. A Secondary Research has two types of source of information, Primary Sources and Secondary Sources. As discussed above the primary sources are Academic Journals, Reports, conference proceedings and government publications.

A few examples of Secondary Sources are:

- **Textbooks –** books are useful in providing a fundamental understanding (such as main theories) of a topic but are unlikely to be sufficiently up-to-date to report on recent research innovation. Many books are not updated frequently. Moreover, books are only published when adequate sales can be guaranteed. Therefore, it is unlikely that books may fulfil current research findings. For the latest understanding of the author of a book, you may ask for help from the library to arrange the most recent edition or an updated copy of the book.

VII. **Trade journals, newspapers and magazines –** these provide useful snippets of information. However, most articles in such sources are not refereed and may be driven by someone's experience. Those type of sources is often driven to sell the idea without providing supporting evidence that gives a solid ground to their claims. Even in newspapers, many articles cover the understanding of an individual. In the newspapers and magazines, some articles are always questionable on suspicion of the truth. Also, many articles are only focused on marketing the idea and only gives positive things about the concept without showing the real picture.

VIII. **Dictionaries and glossaries, encyclopaedias and handbooks –** these provide necessary information about a subject, such as standard definitions. However, those few sources offer a vast range of details about the subject. These are an excellent source for developing your understanding of the topic.

As stated earlier, a research project needs proper planning. A literature review is an essential part of a research project and so do require careful planning. Having several Primary and Secondary Sources available for literature review, a researcher should be cautious while making a choice. A carefully planned literature leads research to an excellent piece of work.

2.5 Planning the Literature Review

In both cases Primary or Secondary Research, if the literature review is involved, it needs careful planning. Planning a literature review is to determine the strategy of searching for literature and critically reviewing it. Planning a literature review is to define the Research **Scope**, **Time** limitation, **Cost** of conducting research and **Quality** of outcome of the research. In academic research, **Scope** refers to parameters that limit research projects due to time and budgetary (cost) constraints. Some researchers (such as for

dissertation) must explore a subject area andfind results within a given period (most likely three months). Funded studies can have limited funding available to complete.

For example, what could be the scope of your research on the below topic?

Topic: - *"Implementing Lean in Construction Projects."*

This title is generic, that is applicable to entire construction projects. It does not limit the study scope to a particular type of construction project. Identifying the scope of the research defines the limitations of the study and brings focus to the subject area. A scope can be determined by, Product, People, Place, Process, Cost and Time.

- **Product-** a research scope can consider, a) the outcome of the research such as (report, publication, framework or suggestion) and b) the analysis based on a class of product such as housing project of construction. Considering the scope of the product, the modified topic could be

Topic: - *"A Framework for Implementing Lean in Construction Housing Projects."*

In this case, the scope of the study is limited to developing a framework for implementing lean within the housing construction industry. The scope can further be restricted to commercial or domestic building construction. For example,

Topic: - *"A framework of Implementing Lean in Housing Construction Projects."*

IX. **People-** a researcher need to define the scope of research that is focused on the reader/audience or the community of practice, such as, the individuals involved in the lean implementation in construction housing projects, and the individuals involved in building houses. Research should determine such below questions before limiting the scope of the study.

- Has anyone else conducted similar research?
- Is your research relevant to practice and theories in this field?
- What is already known or understood about this topic?
- How might your research contribute to this knowledge, or challenge existing theories and beliefs?

X. **Place-** determining the area is to restrict the scope of the study to a particular region. It will be highly unusual that a researcher could have a worldwide reach. Wider the range loses focus to research and ends up with soaring cost and time. The range of the place needs well thought with a clear focus on the limitation of the study. For example, the extent of your research is limited to Wolverhampton City Council. In this case, you will be restricting your research within the Wolverhampton City Council Housing Projects. Therefore, the researcher title could be much focused on.

Topic: - *"A Framework for Implementing Lean in Housing Construction within the Wolverhampton City Council."*

XI. **Process-** as discussed above, research is a systematic process, but the process here is the process that is examined. For example, you can investigate the process of implementing Lean in Domestic Housing Construction or review the construction process of residential housing. The topic may focus on modification such as

Topic: - *"A Framework for Implementing Lean in Housing Construction Processes within the Wolverhampton City Council."*

Once the scope of research is defined, the second step is to sub-divide the literature into topic areas. However, until a researcher has some detailed knowledge of the subject, it is unlikely that sub-divisions can be defined. To gain in-depth knowledge literature review is required to understand the issue and to identify research aim and objectives. A researcher would also require gaining awareness and understanding of research methodology to establish what type of research is needed to fulfil each research objective.
The below example divides the topic into sub-topics and develops a clear structure of the literature review plan.

Topic: - *"A Framework for Implementing Lean in Housing Construction Processes within the Wolverhampton City Council."*

The scope of the study is limited to investigate the Lean Implementation within the process of houses builds within or under Wolverhampton City Council. The limitation set in this study makes it controllable within time and budget. The audience or the people scope for this study would be the council or construction individuals who are involved in the lean implementation, the policymakers, and project managers, Small and Medium Construction.

Enterprises and Main Contractors. However, for the literature review, this topic should be broken down based on the main content. It is recommended that a literature review plan is aligned with the research objectives. Below example could be a logical structure for the literature review.

Example 1: Structure of Literature Review

- ☐ Introduction
- ☐ Lean
  - What is Lean
  - Lean in Construction
  - Implementing Lean in Construction Processes
- ☐ Domestic Housing,
  - What is Domestic Housing
  - Domestic Housing in the Wolverhampton
- ☐ Construction process
  - What is Construction Process
  - Domestic Housing Construction Process
  - Lean Construction Process
- ☐ The framework of Implementing Lean
  - Existing Frameworks of Lean Implementation
  - Frameworks of Lean Implementation in Construction Processes
  - Frameworks of Lean Implementation in Domestic Construction Processes
- ☐ Main Findings
- ☐ Conclusion

As stated above, the literature review structure must be aligned with and fulfil the research objectives/questions. An examination of documents must be critical that draws the main finding against the research objectives and research questions. To outline the aim and objectives of the research and to develop a plan for a literature review requires preliminary research.

2.6 Preliminary Research

The Preliminary Research is the first investigation for preparation of research to understand the current situation about the provisionary idea of research. In the preliminary research stage, the researcher begins the process of finalising the topic and documenting the sources to be used for guidance and support.

This initial research stage is a connection between pre-writing and formulating a theory. This phase is characterised by many of the components of the pre-writing stage, such as gathering information from a variety of Primary and Secondary sources (as discussed above in 2.1). Rather than thinking broadly, as in pre-writing, the goal in the preliminary research stage is to narrow things down and align in on a reasonable scope for the topic (as discussed above).

For instance, you picked a provisionary idea for your research from the conclusion of a recently published journal. The author recommended that,

"*Small and Medium Size Enterprises in the U.K. construction industry need training for an effective Lean Implementation in Construction Projects.*"

An initial research stage enables the researcher to understand the provisionary idea. This provisionary idea may require containing a reasoned argument that can be verified through literature review. Preliminary research helps to set out the Problem Statement and the Gap in Knowledge. Preliminary research also permits the researcher to change his or her mind about the intended topic at an early stage and can avoid delay at a later date. Moreover, during the primary search, if you find that someone else has asked the same research question or you cannot find any research on the topic, in both scenarios, research methodology needs to be changed. However, a preliminary research needs a search strategy such as defining the most suitable keywords. The most common way to find articles is to use online search engines, such as Google, Bing or Yahoo. These search engines have certain criteria for Keywords that return with most relevant articles for your topic. A researcher needs to develop a strategy for keyword search such as what should be included and what is not.

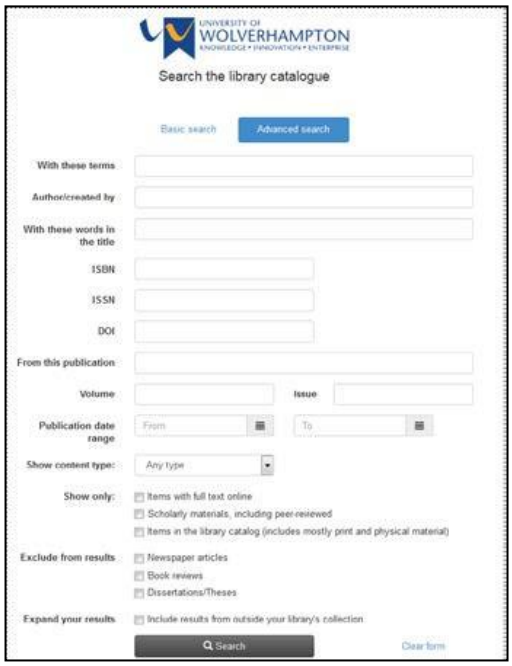
Note: The Conclusion, Recommendation and Limitation sections of below listed sources are good places to look for a provisionary idea for your research. A few good sources are

- a recently published journal article, PhD Thesis,
- Government reports,
- Data published from data.gov.uk Conferences & Conference Proceedings

Discussed briefly in Chapter 8 Writing a Dissertation Proposal

2.7 Keyword Research: Inclusion and Exclusion

Inclusion criteria are characteristics that are prospective and must require items within the literature review. On the other side, the **Exclusion criteria** are these features that are not relevant issues for the study. Inclusion and Exclusion criteria are to develop a keyword search strategy for your literature review.



Keyword research is a practice that is used to find the relevant material for your literature review. Keywords are search terms that people enter into search engines while looking for a similar subject. A search engine can be either your library website or search engines such as Google, Bing.

Keyword searches are a substitute for a content search is the main heading is unknown. The keyword may also be used as a substitute for a title or author search when you have an incomplete title or author information. You may also use the Guided Keyword search option to combine search elements, group terms, or select indexes or fields with being searched. A search engine uses Boolean Operators and Guided Keywords.

2.7.1 Boolean Operators

Boolean Operators are simple words (for example AND, OR, NOT or AND NOT) that are used to join or exclude keywords from a particular search, resulting in more focused and productive results. Boolean Operators save time and effort by eliminating inappropriate materials for your research. Boolean Operators are also used to determine the Inclusion and Exclusion criteria of literature.

- **Using Boolean Operators**

For example, to search articles about “Lean in Construction” you may use keyword Lean AND Construction, in that case, it will search items that have both keywords “Lean” and “Construction”.

Similarly, if you want to find articles that are about "Lean", and are about "Project Management", and the reports that discuss both. In that case, "OR" should be used.

If you want to find articles that are about “Lean”, but EXCLUDE those that discuss “Manufacturing”. In that case, “NOT” is used.

XII. Guided Keywords

A Guided Keyword search helps to find embedded keywords in a record, That could also find keywords in specific areas of the catalogue (e.g., author, title and publisher). This search type is particularly useful for particular items and to create a precise search strategy using a unique keyword that avoids articles and insignificant words (such as- and, or, not, of, for, by and as). An example of a Guided Keywords search is available at http://www2.wlv.ac.uk/lib/Summon/.

Most libraries have a pull-down list to select the areas from within the record to be searched.

In the search term, the Boolean Operator - AND, OR, or NOT – can be used to suggest the search terms to the search engine.

To try Boolean Operators visit http://www2.wlv.ac.uk/lib/Summon/ and try 1) Lean Construction AND Housing, 2) Lean AND Construction, and 3) Lean NOT Construction.

The below examples in images 1, 2 and 3 (see content type area highlighted in the red box) presents the difference between searches above.

You need to decide which content type is much focused on the literature review based on those above the primary and secondary source of information. Since this is a general search, you will need to consider inclusion and exclusion criteria for a further search to get the most relevant literature.

The list of few options is

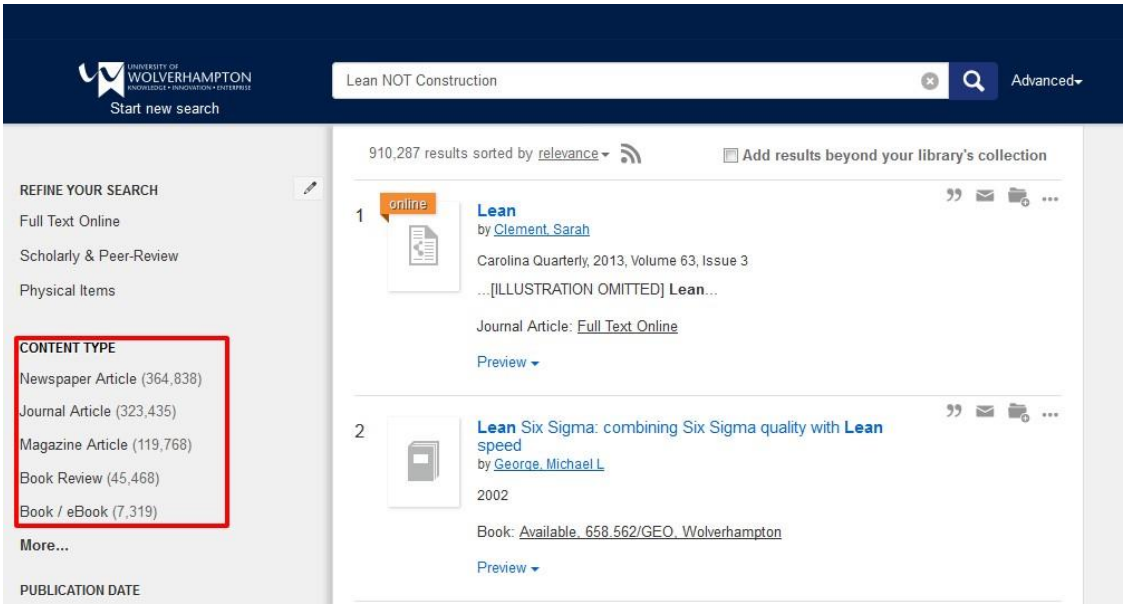
- ☐ With these terms
- ☐ Title
- ☐ Author
- ☐ Subject
- ☐ Publisher
- ☐ Place of Publication
- ☐ Contents/Notes
- ☐ ISSN (enter with dashes)
- ☐ ISBN (enter without dashes)

This example gives four different search criteria listed below. The idea is to find journal articles from general to context-specific keywords while using Boolean operators. The difference of search results is highlighted in below screenshots Screenshot 1 to Screenshot 4.

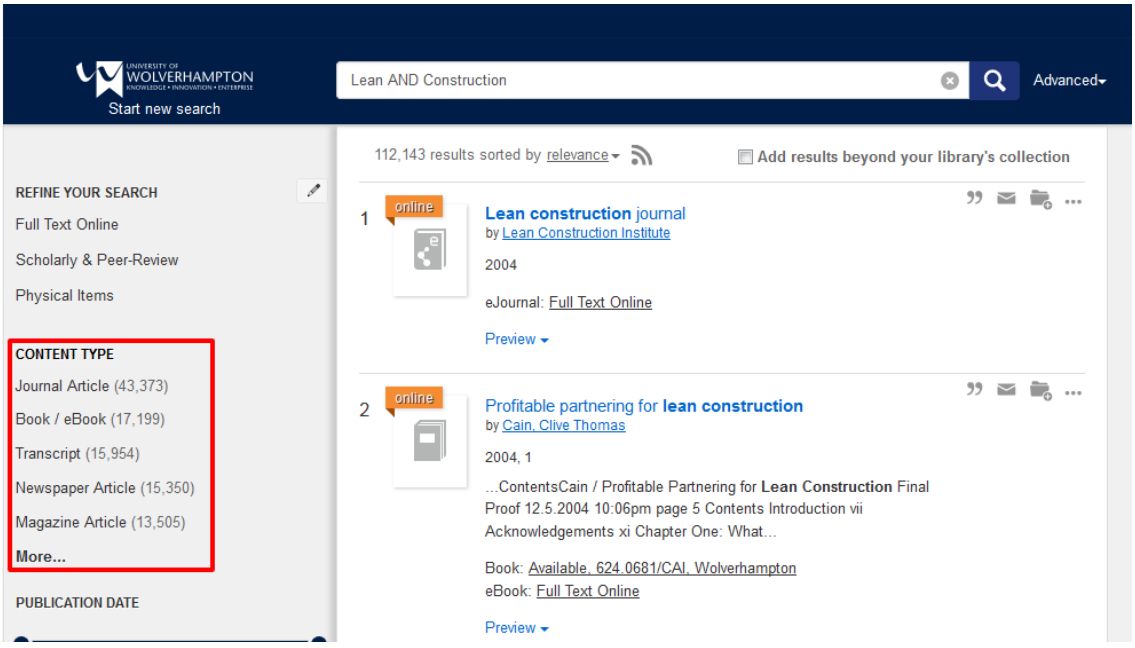
- Lean **NOT** Construction: this is a generic and low focused search that will return will include all the journals and other contents that discuss Lean but will not give you results that discuss Lean Construction.
- Lean **AND** Construction: this is moderately focused search criteria that will return with journal articles that discuss Lean Construction.
- Lean Construction **AND** Housing: this quest will provide much-focused journal articles that discuss the Lean construction within Housing Projects.

Lean Construction **AND** Housing **AND** Wolverhampton: this is a highly focused search that will return with journal articles that discuss Lean Construction within Housing Projects and within Wolverhampton Area.

In above Screenshot 1, the search result for "Lean **NOT** Construction" return back with 323,435 journal articles. These should be avoided because a researcher will not be able to review all those journal articles. However, in Screenshot 2, the search is moderately focused and the results.

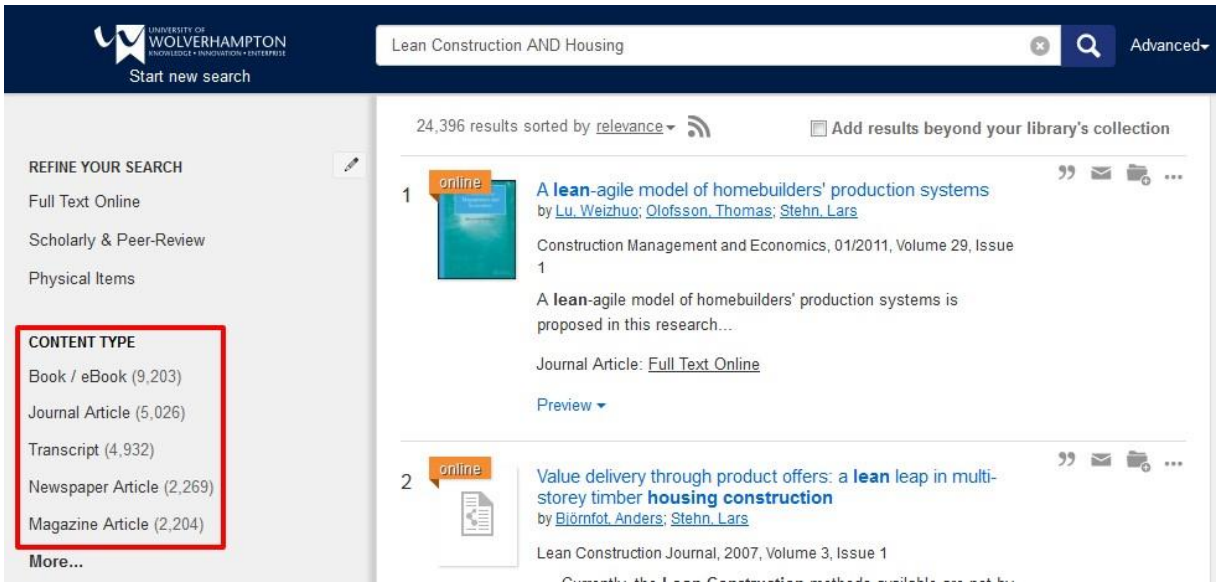


Screenshot 1: Search Results for Lean NOT Construction



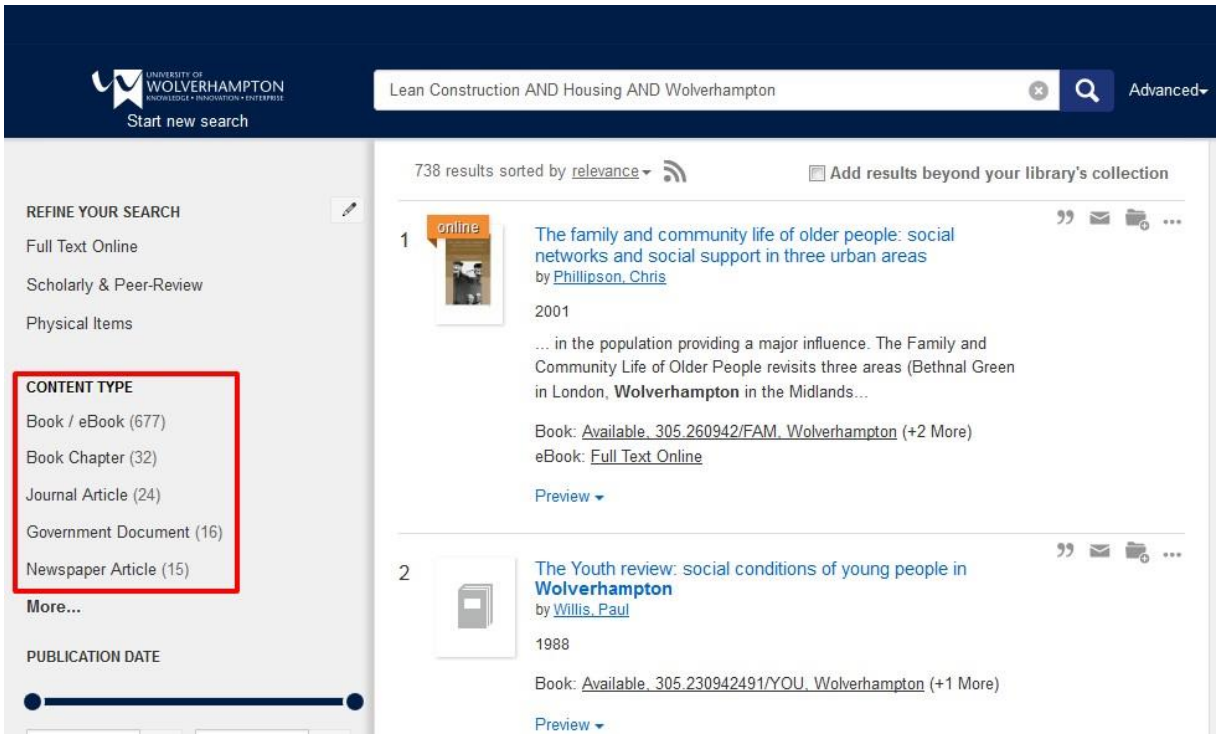
Screenshot 2: Search Results for Lean AND Construction

In above Screenshot 1, the search result for "Lean NOT Construction" return back with 323,435 journal articles. These should be avoided because a researcher will not be able to review all those journal articles. However, in Screenshot 2, the search is moderately focused, and the results present the search result of "Lean AND Construction", you would notice that this search returned with a much lower number (43,373) of journal articles. That is because this time, the search criteria only ask for articles that discuss Lean + Construction. In this case, it returned with results that have nothing to do with Housing Construction.
In below Screenshot 3, the keywords used are "Lean Construction AND Housing" that returned with the specific results with content that has Lean Construction + Housing. The content-type area in above examples gives the overview of the numbers of the Journal Articles (5,026). The numbers are still high to conduct a literature review. Therefore, it needed a much focus search with specific keywords that help to explore a focused literature review.



Screenshot 3: Search Results for Lean Construction AND Housing

Below Screenshot 4, concentrates on the Journal Articles that discuss "Lean Construction AND Housing AND Wolverhampton". The search result return with only 24 journal articles. This is a fair number of journal articles to start a literature review. However, the search could be more accurate in many cases, such as "Lean Construction AND Council Housing AND Wolverhampton UK" however, as this is precise search, the search engine may not be able to provide any results. In that case, alternative contents such as government documents or alternative search engines can be explored.



Screenshot 4: Search Result for Lean Construction AND Housing AND Wolverhampton

2.8 Critically Reading, Thinking and Analysing

As stated above, a Literature Review needs critical examination. The aim of writing the literature review is NOT to give a list of other author's work. A critical review aims to compare and contrast what other authors have done and written about the topic in the past. It may be useful to keep the following four questions in mind when writing the critically analysed literature review.

- What are the similarities?
- What are the common issues?
- What are differences or contradictions?
- What are the criticisms?

A critical analysis needs the essential ability of reading, and critical thinking before the other's work is analysed and interpreted. Critical reading is a form of literary analysis that does not account the research on its face value but deeply examines the claims made by the author such as analysing facts that are the basis of the conclusion drawn. Critical reading needs critical thinking to investigate-

- Why was this written?
- What does the writer offer?
- Can you identify their argument?
- What proof do they give? - Is it valid?
- Are there other viewpoints?

- What is the writer, not telling?

Critical reading is to assess the strength of the argument provided by others, instead of finding fault or weakness of a study. It is just to understand that the documents (such as- journals and articles) you included in your literature review is the most reliable for your study. In critical reading, the reader asks further questions such as

- What is unique about this study?
- How are the conclusions drawn?
- Why the author takes such an approach?
- Why should (on what grounds) I accept the claims made by the author?
- How is it relevant to the study?

The most import features of critical reading are

- To examine the evidence or arguments presented;
- To check out any influences on the evidence or arguments;
- To see the limitations of study design or focus;
- To review the interpretations made; and
- To decide to what extent you are prepared to accept the authors' arguments, opinions, or conclusions.

However, a researcher needs the ability to critical thinking to think clearly and rationally. This is to understand the logical connection between ideas within one study and across the different studies. Critical thinking involves

- Not taking everything you read for granted
- Identifying potential strengths and weaknesses in a text.
- Evaluating what you read and relating it to other information.

Critical thinking is to determine the importance and relevance of the argument given by other authors for your study. Critical thinking, lead a researcher to recognise, build and appraise the arguments presented by others. Moreover, with critical thinking, a researcher identifies inconsistencies and errors in reasoning and approach problems consistently and systematically. If the piece of writing does not develop an argument is often considered as descriptive writing.

Descriptive writing just sets the background within which a case is developed. Descriptive writing represents the situation as it stands, without presenting any analysis or discussion. Descriptive writing is relatively straightforward that just provides information. In descriptive writing, a student is just reporting ideas but not taking them forward in any way with the argument. An essay using only descriptive writing would, therefore, gain only a few marks.

However, with critical writing participates in the academic debate. It became challenging while weighing up the evidence and arguments of others and contributing your analysis on other's work.

As aforementioned, critical writing considers the quality of the evidence and argument of others and the researcher. In this, a researcher identifies key positive and negative aspects of other's work while assessing their relevance and usefulness to the topic a researcher is investigating. The critical writing requires critical reading and critical thinking ability to identify how best other's work is relevant for your study and can be synthesised into the interpretation that you are developing.

A researcher needs a higher level of skill for critical writing than for descriptive writing. Table 4 below gives the difference in descriptive and analytical writing.

Table 4: Descriptive and Critical Writing

Descriptive Writing	**Critical Writing**
States what happen	Identifies the significance of the study
States what something is like	Evaluates strengths and weakness of a study
Write the story so far	Weight one piece of information against other
States the order in which things happen	Makes reasonable judgements
Says how to do something	Argues the case according to evidence
Explains what the theories say	Demonstrates why these theories are relevant to your study
Explains what methods that are used	Identified why the methods are appropriate
States options	Give reasons for selecting each option
List details	Evaluate the relative significance of details
Give information	Draw conclusions

Adopted from: Greener (2008, p26), Business Research Methods, Available at boonbooks.com

2.9 Summary

A literature review is the investigation of existing studies for research such as conceptual, pure and academic research. However, another type of inquiry, such as applied, Industrial and Empirical research also demands a literature review. That means the literature review is necessary for all kind of research. Even though to support the findings from Qualitative and Quantitative research, a literature review is essential in academic studies.

The literature review must be critical. Writing a critical literature review requires the ability to read and think critically. A literature review is NOT to describe the work of others but to determine the importance of the information. Also, it establishes the strengths and weaknesses of the topic and measures one piece of evidence against another to build an argument while providing relevant evidence from Primary and

Secondary Sources. Finding the appropriate Primary and Secondary resources for a literature review is an important task that needs a good search strategy. Using Boolean operators is part of the search strategy to search for context-specific literature. However, when it comes to reviewing the literature on similarity and differences need critical reading, critical thinking and critical writing skills. These skills are necessary to write a structured literature review that aligns with research aim and objectives.

2.10 Activity

Select one or more below that indicates, the purpose of the literature review. Tick ☑ for right and ☒ for the wrong answer.

☐ to identify gaps in literature

☐ to identify major seminal work

☐ to provide a context for your own research

☐ to identify main ideas

☐ to search for quantitative work

☐ to identify main methodologies

☐ to Identify gaps, problems or limitations in existing research

☐ an annotated list of books and articles

Tick ☑ or ☒, which of below are the primary source of literature?

☐ Academic refereed journals

☐ Dissertations/theses

☐ Text Books

☐ Data from unpublished sources

☐ Reports/occasional papers

☐ Publications by non-profit agencies

Tick ☑ or ☒, which of below are the secondary source of literature?

☐ News Papers

☐ e-books

☐ Dictionaries

☐ Data from unpublished sources

☐ Data from www.Gov.co.uk

☐ Reports

Which of below option is NOT a Boolean Operator? Select ⊙

○ AND

○ OR,

○ IF

○ IF NOT

○ AND NOT

Develop a literature review plan for the below title. The plan should contain all headlines that may appear in Introduction, Main Body and Conclusion.

Title: Advancing Supply Chain Collaboration in Construction Projects through Building Information Modelling (BIM).

Give headlines below on how your essay will be structured.

Writing Introduction should

- establish the context, background and/or importance of the topic
- indicate an issue, problem, or controversy in the field of study
- define the topic or critical terms
- state the purpose of the essay/writing
- provide an overview of the coverage and/or structure of the writing

Source: http://www.phrasebank.manchester.ac.uk/introducing-work/

Reading List

(Goatly 2013; Pirie 1985; Wallace and Wray 2016; Jonathan Lavery and Willam Hughes 2008; Cottrell 2011; Machi and McEvoy 2016; Diana Ridley 2012)

Cottrell, S. (2011). *Critical thinking skills : developing effective analysis and argument*. 2nd ed. Hampshire: Palgrave Macmillan.

Diana Ridley. (2012). *The Literature Review: A Step-by-Step Guide for Students - Diana Ridley - Google Books*. 2nd ed. Sage Publication.

Goatly, A. (2013). *Critical reading and writing : an introductory coursebook*. 1st ed. London and New York: Routledge.

Greener, S. (2008). *Business Research Methods*. 1st ed. n.d: Ventus Publishing ApS.

Jonathan Lavery and Willam Hughes. (2008). *Critical Thinking: An Introduction to the Basic Skills*. 5th ed. Toronto: Broadview Press.

Machi, L.A. and McEvoy, B.T. (2016). *The literature review : six steps to success*. 3rd ed. NY: Corwin.

Pirie, D.B. (1985). *How to write critical essays*. London and New York: Routledge.

Saunders, M., Lewis, P., and Thornhill, A. (2009). *Research Methods for Business Students*. 5th ed. London. Prentice Hall

Wallace, M. and Wray, A. (2016). *Critical reading and writing for postgraduates*. 3rd ed. Croydon.

CHAPTER 3

ACADEMIC WRITING SKILLS

3.1 Preface

Academic writing is essential to convey your knowledge. Academics use this form of writing to develop an argument about the particular discipline. Students, faculty and researchers fall into the category of academics. Lack of skills in academic writing produces a weak discussion on the specific subject. Academic writing demands to extract findings from critical analysis of literature and/or data. The results from the critical analysis are further needed conveying in a way that is understood by the targeted audience. However, due to the lack of academic writing style, a more significant number of research (such as dissertations) fail to convey the message to the audience.

Different styles of academic writing are discussed in this document. This paper is divided into three sections.

- Introduction to academic writing
- Referencing
- Paraphrasing

Learning Outcome You will be able to:

- develop your understanding of academic writing
- advancing your note-taking skills in lectures and seminars
- develop your skills of writing an introduction, main body and conclusion
- build your knowledge about referencing within the text
- develop your skills of paraphrasing

3.2 Introduction

The term 'academic writing' refers to the forms of writing that set forth an argumentative style used by academics, including students, faculty, and researchers. In academia, a student must use an academic writing style.

Academic writing-

- Is to convey the body of knowledge or information about a particular discipline
- Is used for writing formal essays and other assessments for coursework
- Helps to write an excellent dissertation that attains a good grade
- Is all about accuracy and careful choice of words, and
- Is different from a person writing.

Academic writing has a structure such as a beginning, middle, and end. This simple structure is typical of an essay format. However, some assignment, reports writing tasks, may not have a formulated structure. In general, an academic writing structure has an Introduction, Main Body and a Conclusion.

I. **The introduction** of an essay is to inform the reader about what is discussed in the main body of a document. The introduction also sums up the discussion and findings very compactly that are discussed in the main body of the essay.
II. **Main Body** of an essay is mainly to discuss the issues that surround the main topic.
III. **Conclusion**, at the end of the document, may summarise the overall points made in the main body of the essay, but apparently, just the most important ones, as there is often never the word space to do so. The concluding paragraph may also recommend the way forward that touches the implications of findings (from the main body of the essay) for future advancements surrounding the issues addressed.

Unlike most essays, a report is divided according to clearly labelled sections, such as "Introduction", "Discussion", "Conclusions", and "Recommendations". However, as aforementioned, there is no formulated structure.

While writing discussion, conclusions and recommendations, making your judgements are possible in academic writing. However, there is an expectation that you will support your opinion by linking it to the published author (through referencing and citing- discussed below). It is essential for academic writing to reference the work of others. Citing shows, you have read the literature, understood the ideas, and have integrated these issues and varying perspectives into the assigned task.

Moreover, academic writing should always follow the rules of punctuation and grammar. It is essential that a reader of your work is likely to be very different from you (regarding understanding/knowledge) and may not always know what you are referring to. Therefore, academic writing needs the skills of note-taking, introduction writing, main body writing and conclusion/summary writing.

3.2.1 Note-taking

Educational topics are focused on true things, like real ideas and concepts, which brings robust views about the issue. Hence, note-taking should concentrate on the physical, practical, and functional tasks. However, academic writing is often more likely to focus on general processes and relationships. Despite the trueness of some educational topics, you may be able to adopt robust and physically oriented words that explain the ideas and the relationships between them.

Typically, academic writing requires you to confirms the topics and their links to others. However, dealing with a practically oriented subject (such as computer science, construction, nursing, or teaching), would require investigating theories, philosophies and concepts, that underlie the practical nature of the activities. Therefore, academic writing tasks require digging deeper into literature for underlying principles, theories, and concepts. Investigating theories and concepts confirm alternative explanations for the prevailing school of thoughts, processes and procedures. That is where you need note-taking skills to understand the common practice, processes and procedures.

I. Taking notes from a speech

Taking notes in a lecture, seminar and the workshop is a difficult task. As often it is inappropriate to request a speaker to repeat. Due to the fast pace of speakers, mostly potentially essential points are missed. In that situation, the three most important aspects to be considered are

- Be selective- to identify the main points
- Be brief- use abbreviations
- Be clear- about the speaker makes the relationship between the point To be concise on note-taking below is the list of some points to remember.
- In a classroom setup, use the tutorial handout as the framework for taking your notes.
- Find information about the subject beforehand to avoid missing points.
- Read any relevant study material or notes before the session.
- Be attentive- the speaker may indicate significant instants by saying things such as: "The three most important points are ...", or "Moving forward to the related topic..." or "Similarly,".
- Read the notes soon after taking them and reflect on what happens to embed the content in your memory.

II. Identifying the main points

While listing to the speaker, identifying the key points is vital. Key points are often found during the introduction and conclusion. However, a speaker can emphasise the main points anytime during the discussion. To identify the main points, you should,

- Listen carefully to the introduction and conclusion

- Look for signposting one language
- Listen to the words the lecturer emphasises
- Remember examples that illustrate a point

III. Taking notes

Note-taking is tricky. Every student can have or develop their style of note-taking. Some students intend to write everything a speaker has said; others may just write some phrases. Since the students are technology literate; the students prefer to record the lectures on mobile devices for later reference. However, while transcribing that speech could be a time-consuming task. Therefore, as aforementioned, while taking notes, a student should consider, writing down keywords, using the abbreviation and using symbols. Adopting note-taking symbols and abbreviations are a fantastic way to accelerate your note-taking skills.

Writing down keywords- look for keywords instead of drafting the full sentence of the paragraph. As an example, "Is project management skills essential for construction project managers?"

Keywords for this sentence could be – "Project Management, Skills, Construction, Project Managers". **Use abbreviations**- to save time above sentence can be written with abbreviations such as, "PM, Skills, Cons, PM".

In this example, you will realise, PM is used for both the Project Management and Project Managers. To avoid confusion that can be changed as "PMngmt, Skills, Cons, PMngrs". You can also use symbols (such as &, +, =) that represent the connection between those keywords.

Using symbols- revisiting the original sentence below symbols can be employed.

Symbols for note-taking

@	at
-	mi
=	nus
≠	equals is the same as results in not equal
~	about, around
>	greater than less than
<	increase, rise
↑	rapid increase, rise, growth decrease, fall
↑↑	rapid decrease
↓	causes produce, leads to
↓↓	yes, correct
→	definite, absolute, sure number, pound
ü	important wrong
ü	not proven incorrect unsure, not proven
ü	per therefo re
#	becaus e
*	withou t that is
x	
x	
x	
?	
/	
∴	
∵	
b/c	
w/	

Sentence: "Is project management skills important for construction project managers?"

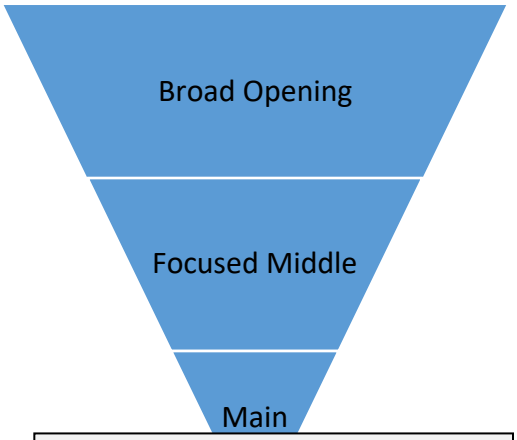
Notes: "Is PMgmt skills * 4 cons PMgrs?"

The original sentence has 12 words and 75 characters; the recorded note has seven words but 25 characters. With symbols, a student can save a substantive amount of time to write a note.

3.3 Introduction Writing

As stated above, the introduction your paper provides prime impressions of your argument, your writing style, and the overall quality of your work to the reader. An introduction section is usually between 5% to 10% of the total essay (until specified in essay guideline). For example, the whole word limit for an essay is set to 1000 ± 10% words. Therefore, the introduction section must be organised 50 to 100 ± 10% words. An unorganised introduction is boring that creates a negative impression. However, a concise, engaging, and well-written introduction encourages the reader to read further. An introduction concisely conveys substantial information. It tells about the importance of research, and methodology adopted to fulfil the study.

In many academic disciplines, an introduction should contain the main argument. An introduction should provide a sense of the type of information that is used to develop the case and the general organisation of the work. Introduction and the main body of research should establish a close link between them.



The introduction should capture a reader's interest, making them want to read the rest of your work. An introduction should open with a compelling statement or an interesting question that capture the attention of readers. Setting a brilliant example can invite readers to engage with your research.

The opening sentences of introduction can be broad and general that gradually focuses to reader onto the topic and finally onto the main idea of the essay and summarising the main points. A few tips for writing your introduction are.

An introduction should begin with a broad opening statement that establishes the context of the essay. The author should decide how wide, or extensive an opening should be. An introduction should provide the reader with a sense of what they should expect out of the essay. It should start relatively broad, then narrow to the statement, but make sure not to divert from the topic.

As stated above, an introduction is to tell the reader about the study, how it is organised, and what is in the essay/report/dissertation.

Writing Introduction should

- establish the context, background and/or importance of the topic
- indicate an issue, problem, or controversy in the field of study
- define the topic or critical terms
- state the purpose of the essay/writing
- provide an overview of the coverage and/or structure of the writing

Source: http://www.phrasebank.manchester.ac.uk/introducing-work/

Ending of the introduction should narrow down to the main issue or problem statement and establish a clear view of key finding or lesson learned.

XIII. Learning points:

- Try writing your introduction at last.
- Write a provisional introduction first and then change it later.
- Open with something that will draw readers.

An Introduction example is given below. In this example, the author gives a broad statement and tries to establish the importance of the study. In the first paragraph, it reflects the current state of the United Kingdom (UK) construction industry and what challenge is faced. It also gives a problem statement towards the end of paragraph "*it has been an immense challenge for project managers to enhance the flow of communication between the project teams*". In the second paragraph, it established how this research is conducted and what methodology is adopted to identify the issues. Finally, the main findings are given to set the scene for the reader about where the research is leading.

Example:

The UK construction industry consists of over 280k firms (contracting, services and products) employing over 2.93 million people (10% of total UK employment) in a multitude of roles (BIS, 2013). BIS (2013) also stated that the construction industry is known as one of the knowledge-based value-creating industries. However, fragmentation in the Construction Supply Chains harms the construction industry and construction projects. This is because, the construction sector consists, at least 99.9% of firms are Small and Medium Enterprises and, of those, about 70% employ no more than one person (BIS, 2013). Therefore, it has been an immense challenge for project managers to enhance the flow of communication between the project teams.

This study/essay/report/paper focuses on the UK construction sector to identify the existing trends, highlighted problems within the industry and perception of growth within the industry. This review, The Latham Report, The Egan Report and The Wolstenholme Review since the 1990s until the date. Moreover, in conjunction with these reports, this investigates, the BIS reports, HMRC reports and published journals and other literature from 2007 until 2017. The analysis focuses on identifying the challenges to achieve growth in the sector.

This review of the literature provides a solid base to identify and evaluate the challenges to the growth of the UK construction sector. In this study, the following two main challenges are found

- Contractors have the traditional way of doing business.
- The nature of the construction industry is fragmented.

Note: see Academic Phrasebank to learn writing introduction http://www.phrasebank.manchester.ac.uk/introducing-work/

3.4 Main body/Content writing

This section drives the most marks; therefore, investing time in this section is well-worth. It is the only section where you can support the analysis and reasoning with theoretical ideas, concepts, and models available in the literature. Secondly, this section is to provide evidence to back up the arguments, conclusions and recommendations through referencing and citation. This section requires good evidence from the literature is needed to support the arguments.

Writing the main body of the essay should be focused on the central theme set in the middle of the introduction and carry forward the critical analysis of the main points discussed. This section is also to establish the argument about the main findings.

Main Body of an essay also requires a good structure. Based on the above example set in the introduction writing the literature review should involve "The Latham Report, The Egan Report, The Wolstenholme Review, BIS Reports and HMRC Reports". However, the literature review should not be restricted to those reports; it will also require different thoughts from other published media such as books, journals and other reports.

A structure of the main body could be

I. **Identifying the problem**

Example: the problem involves a lack of communication between project teams.

II. Identify the causes

Example: Lack of communication between project teams is because of the construction contractor's traditional ways of doing business and remains highly fragmented.

III. Identifying the symptoms

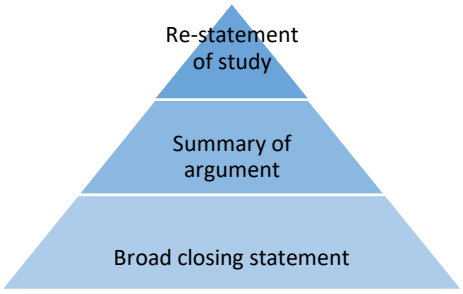
Example: resultant construction projects suffer low productivity.

IV. Identify the possible solution

Example: advancing communication between construction teams, high growth of UK construction projects can be achieved.

3.5 Summary/conclusion writing

The conclusion is a position, opinion or judgement reached after consideration. A summary or conclusion writing section focuses on the rounding of the discussion and reminds us about the essential points of your study.



In general, a conclusion paragraph starts with a small statement. That statement should link with previous sections. Afterwards, it gives a summary of argument conducted in the main body of the essay/report/dissertation. Here you should mention the most critical points that are highlighted in the discussion. Finally, finish off with a broad closing statement. A compelling summary

- Contains the main points
- It is shorter than the original
- It is rewritten in your own words
- Points are linked with connecting words
- An in-text citation is required.

You can also add recommendations and limitations to the study in this section. For example, limitations of the study set in below example could be. Writing limitations of the study is widely expected in dissertation and journal article writing. Conclusions of the dissertation generally also establish its contribution to existing literature.

3.5.1 Stages of Summary Writing

Summary writing is a process that has several stages. Eight stages of summary writing are given in below Figure 1.

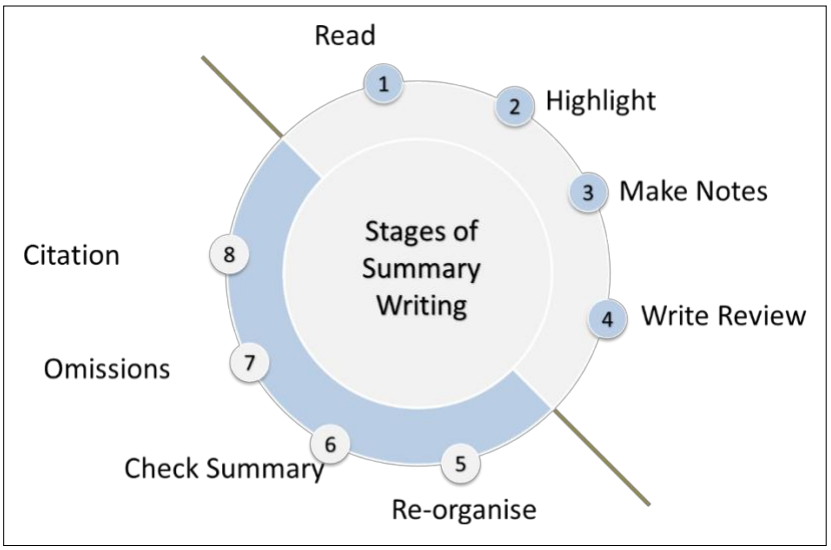


Figure 1: Stages of Summary Writing

Read Carefully - At the first stage, read the text carefully. This stage needs critical reading skills. Reading information from other sources concentrates on findings the quality of argument given by the writer. Reading other's work to support your arguments is to look for the uniqueness and authenticity of the information and how it is relevant to support your study. Repeat the reading until the idea convinces you of the author.

The second stage is to underline/**highlight** the fundamental ideas given in the source of information. Highlighting requires the essential points given by the author or the most relevant ideas for your research. Once the main idea/s is highlighted, the third stage requires to **take notes** in your own words. While taking notes, it is essential to identify the main points. While comparing the views of different authors such as agreement and disagreement, separate notes should be taken from each author.

Once the notes are taken, the fourth stage is to **write a review** of the information from another author/s. Summary for each authors work should be written separately before comparing it with other authors. Writing a review needs asking questions such as what is the main view of the author, what are the main points made. The other issues could be, what did you like or dislike about the opinions of the author and how did the author support the argument.

Once you have all the reviews, it needs to **re-organise** the order of ideas where necessary. For example, you have collected and reviewed information from ten different authors. Those reviews now need to organise based on the most relevant to least relevant in support of your claims. Moreover, in the case of comparison, those reviews can be arranged in favour of agreement or disagreement of the issue. For example, how many the author agrees and how many disagree on the subject.

Once the reviews are organised, **check the summary** for **omissions.** Omissions are to develop a focused argument and delete the irrelevant text or discussions that do not support your views. Moreover, the omission is to check if something important is still missing from the arguments such as underpinning theories. However, a critical analysis requires analysing information from all dimensions to develop a robust argument. That means most relevant reviews either it agrees or disagrees with your issue, should be compared in summary. Finally, **add the in-text citation** to refer to the source of information.

1. Literature review
2. Prepare questionnaire
3. Recruit respondents
4. Conduct interviews
5. Prepare data transcript
6. Input data in NVivo
7. Analyse results
8. Write analysis chapter

3.6 Example: Conclusion/Summary

Based on the above discussion, this study establishes a generalised conclusion that **enhancing the flow of communication between organisations and individuals can bring efficiency in construction projects**.

This study started with the aim to identify the challenges that hinder the flow of communication between the project teams. This study found that the foremost problem that impedes the flow of communication in construction projects is the fragmented nature of the construction sector. The negative impact of fragmentation is appeared to be affected by the supporting causes and supporting factors such as lack of partnering and collaboration; lack of construction processes integration, lack of adequate knowledge management systems, lack of trust and motivation among individuals and organisations. Surprisingly, the literature review reveals a few interesting themes, which supported main challenges such as, lack of skills in the construction sector (BQF, 2013 and Guo, 2012), lack of adequate support to grow (BIS, 2011, 2013b; Schulz, 2012) and lack of learning capacity and capabilities (Baets, 2005; Tsai, 2001). Moreover, investigation of literature also led this study to conclude the root cause of the lack of communication is an insufficiency of communication skills of project teams. Furthermore, that concluded that inadequacy of knowledge communication is because of the lack of individual and organisational capabilities and lack of awareness of the importance of knowledge communication among them.

3.6.1 Referencing

University assignments typically use a source of information from the authority. Published material such as journals, published reports and books are the authorities for the primary source of information. These sources are used to provide evidence in the form of – general ideas, critical evaluations, research findings, and scholarly opinions. The evidence from those authorities is essential to support your arguments and conclusions of the research. APA and Harvard's style is the most common referencing system adopted by the universities within the UK to look for evidence.

I. Where to start?

To support your arguments information such as the name of author, publication date is required for every source you are using. Such information to look for is:

- **Author-** Who wrote the book/journal/source you're using? If the author only wrote one chapter in a book, who is the editor of the book? Make a note of both.
- **Date published-** Look for the year the source was published (this is not necessarily the same year it was printed).
- **Title-** What is the title of the book, journal, journal article or report?
- **Publication details-** the name of the organisation which published the book and the place such as the name of town/city of publication.
- **Website address-** Make a note of the date you used the website too.
- **Page numbers and edition numbers-** the page number of the book and the edition number of a book such as 1st, 2nd, 3rd.

Below is the standard checklist is given by Pears and Shields (2010). This list exhibits the type of information required while referring to the other kind of media. For example, in the case of supporting your argument from a book, you will need, the name of the author, year of publication, the title of the book, place of publication, the name of publisher and book edition. However, in the case of supporting your argument from a book chapter or a particular section (or in the case of quoting other's work), you will need page number as well.

Checklist of what to include for the most common information sources:

	Author	Year	Title of article	Title of publication	Issue	Place	Publisher	Edition	Page number(s)	URL	Date accessed
Book	Y	Y		Y		Y	Y	Y			
Chapter	Y	Y	Y	Y		Y	Y	Y	Y		
Journal article	Y	Y	Y	Y	Y				Y		
E-journal article	Y	Y	Y	Y	Y				Y	Y	Y
Internet site	Y	Y	Y	Y						Y	Y
Newspaper article	Y	Y	Y	Y	Y				Y		

Source: Pears, R. and Shields, G. (2010) Cite them right: The essential referencing guide. 8 ed. Basingstoke: Palgrave Macmillan

See below link for more details for Harvard style referencing guide. https://www.wlv.ac.uk/lib/skills-for-learning/referencing/

II. Where is the reference needed?

Generally, references are required at two places- within the main body of the paper, and within a bibliography section of your document. Below example is given for reference within the text of your assignment.

> Example: Lean construction is a new way to manage work over the life of a project. It is not a productivity improvement programme (Sacks et. al., 2010). Also, Smith, (2015) stated that Lean construction is a modern way to design and build capital facilities. Moreover, according to Koskela, (2008), the application of Lean production management to manufacturing caused a revolution. The objectives of the Lean production systems are to maximise value and minimise waste through applying Lean techniques, to a project-based production system (Childerhouse, et. al., 2003). Lean Construction is particularly useful on complex, uncertain, and quick projects.

This example takes another author's work to talk about Lean Construction. Therefore, the author must explain to the readers about where that information has come from. It does not matter whether you have used a book, a journal article, a website or watched a film. In the case of mentioning other's work in research, it is essential to mention the author's surname and year of publication. For example, Mr A. Smith has published a journal in the year 2015. In this case, the in-text reference would be (Smith, 2015). Incorporate other's work into your essay has several ways such as using quotations, using more than one reference and paraphrasing those are discussed in the below sections.

3.6.2 Using Quotations

You can quote the exact words of other's to use for your essay needs. For example, you copied a definition from a book by Lewis. The copied description will need speech marks. The reference will need three things, 1) surname of the author, 2) the year of publication of the book and 3) the page number where the definition is given in the original book. So, it might look something like this:

> Example: Lewis (1997, p.32) defines that *"Project management is the planning, scheduling, and controlling of project activities to meet project objectives."*

In this example, the book was written by Lewis, published in 1997, and the definition is taken from page number 32 of the book.

Points to remember

- Do not quote too much of text.
- Text such as definitions is useful in quotes.
- The sentences with quotes link together with previous and following sentences and create a flow for the reader.

3.6.3 Multiple references

There would be many instances when you realise that more than one author has said the same thing on a particular topic. Mentioning several authors who agree or disagree on a specific issue shows that a wide range of evidence is provided. It is typically used to demonstrate the argument about similarities and differences or agreement or disagreement between other authors. This is good academic practice. The below examples show the use of more than one author to develop a supported argument.

> Conboy & Fitzgerald, (2004), Crispin & Gregory, (2009), Basu & Wright, (2010) and Raschke, (2010) all agreed that the delay in construction projects is caused by the lack of communication between teams." However, Christopher, (2000) Conboy & Fitzgerald, (2004); Gunasekaran, (1999); Yusuf et al., (1999); Raschke, (2010) and Bredillet, (2013) all disagree that the cause of delays in construction projects was not the lack of communication between teams but agreed on the lack of project planning.

3.7 Paraphrasing

> **Copying and changing a few words is NOT paraphrasing.**

Paraphrasing is retelling other author's work in your words. It is not like summarizing the work of others, but to condensing the information and presenting in in your terms. This aims to rephrase the work of others by using different words and phrases.

Figure 1 gives five stages of paraphrasing. Stage 1 and 4 have sub-stages. The first stage is to read the original text several times critically. Reading the work of others is essential to understand what this author is offering, What is the argument, and how and why it is relevant to your research? Once you understand the points made by others and how those

> **"Putting authors' ideas in YOUR WORDS is likely to be the SKILL you will use MOST when writing university assignments. It's worth investing time to develop this SKILL."**
>
> Jecinta and Andrew (2010)

points are related to your work; then you should seek a strategy to paraphrase it in your words. Here you can use synonyms and keywords but should not change the technical language. Such as changing "project management" with synonyms may modify the meaning completely. Therefore, it is stage two and three recommends that you should make notes from the work of others and then paraphrase from the notes. The fourth stage is to check your paraphrase text against original text

for accuracy of argument and making sure that your text conveys the same message without being too similar to the original version. You can use new vocabulary for possible words. Finally, you must add the reference/citation (author's name and year of publication) of the source.

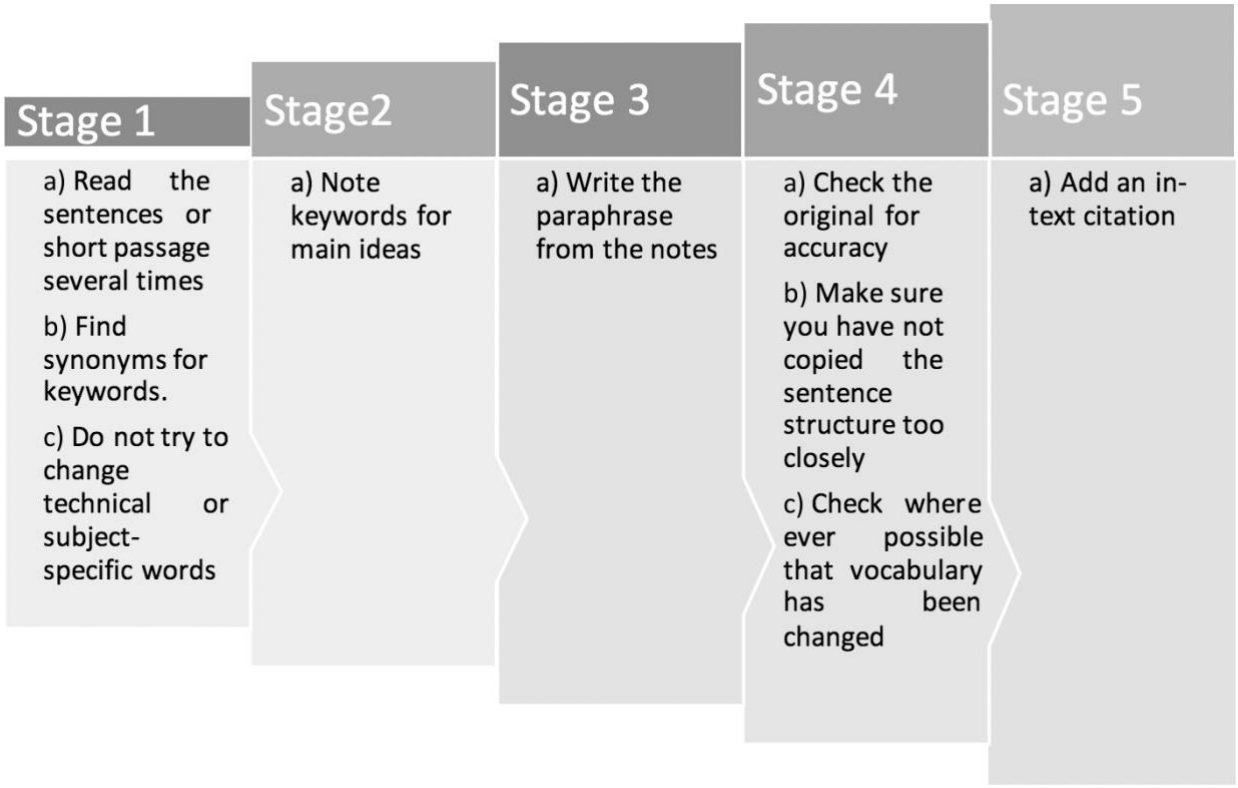


Figure 2: Stages of Paraphrasing

As already highlighted, you must create enough distinction between your paraphrased version and the author's version. Commonly, many students do not make enough of a difference between their words and the other writers. In some cases, for instance, you may copy long phrases from the source and only change a few terms through synonyms. Below is an example of the **WRONG** style of paraphrasing. In this example, a few words (generally, high, low) are changes with synonyms a few words (suffers with) are added. This is an illegal practice of paraphrasing. Below example demonstrates the right practice of paraphrasing.

Original Sentence:

"The construction industry is generally categorised with high fragmentation and low productivity."

WRONG Paraphrasing Practice

The construction industry is broadly categorised with eminent fragmentation and suffers with down productivity.

Remember: Paraphrasing is when you use another author's work in your essay, but rather than quoting the exact words they have used. Putting other's idea into your own words still, belongs to the original author. Therefore a reference must be provided.

Changing the grammar of the sentences is a type of paraphrasing. Changing words in the original text with synonyms, joining short sentences or splitting up the sentences are all form of paraphrasing. Moreover, change the order of concepts within a sentence or changing the voice of sentences (such as active to passive or vice versa) or changing adjectives and nouns to verbs is paraphrasing.

Example 1:

Original Text: *"Projects can vary in size, and small projects can be planned and managed by the same person whereas larger projects may employ thousands of people working on many sites and require a dedicated group to manage and coordinate the activities."*

Paraphrased 1: As Newton (2008) pointed, small projects can be efficiently planned and managed by the same person. However, large projects need a dedicated project management team to plan and manage projects.

Paraphrase 2: Large projects need a dedicated project team to plan and manage project activities (Newton, 2008).

Example 2:

Original Text: *"The value management process is acknowledged as having forced parties, who would not ordinarily engage in direct communication, to co-ordinate their efforts."*

Paraphrase 1: According to Fryer (2004,p 200) due to the value management approach, groups who would not usually communicate directly are steered into collaboration

Paraphrase 2: Groups who would not often interact directly with each other work together as a result of the value management process.

Paraphrase 3: Fryer (2004, p.200) points out that it is accepted that the value management approach ensures that groups, who do not typically communicate directly, work closely together.

3.7.1 Summary

Academic writing skills are essential for writing essays, reports, dissertation or any academic work. A student must have this skill to gain a higher grade. Note-taking is a critical task in academic writers. Note-taking from speech requires an understanding of symbols and abbreviations.

A general style of essay structure has Introduction (opening), Main Body (discussion) and Conclusion (closing). The start of an essay tells the reader about the main statement of study how that will be investigated and what are the main findings. The main body of the essay contains the literature review to fulfil the investigation. That section also includes arguments such as agreement or disagreement with published authors. The summary/conclusion section establish your opinion about the discussion and arguments developed in the main body of the essay.

Along with note-taking, referencing and paraphrasing are essential skills for academic writing. Through referencing and citation, an author supports the arguments and conclusions drawn. Paraphrasing with references establishes that student has looked at the topic from all possible dimensions.

Tips:

- Be clear
- Be accurate
- Be concise
- Use synonyms
- Change the word class
- Change from active voice to passive voice

3.8 Activity

Paraphrase the Following Sentences

Collaborative agreements are said to avoid the waste of resources that traditional fragmented and adversarial relationships engender, and encourage innovation, which leads to the enhancement of value.

The contribution of the contractor's expertise in such activities is helpful for the improvement of project value, and long-term collaborative agreements can provide more significant opportunities for such involvement.

Useful Sources for academic writing skills

Goatly, A. (2013). *Critical reading and writing : an introductory coursebook*. 1st ed. London and New York: Routledge.

Jecinta, M. and Andrew, K. (2010). Academic Writing, 0800. *Journal of Political Economy*, (627 739).

Pirie, D.B. (1985). *How to write critical essays*. London and New York: Routledge.

Stephen Bailey. (2011). *Academic Writing: A Handbook for International Students - Stephen Bailey - Google Books*. 3rd ed. London: Routledge.

Sword, H. (2012). *Stylish academic writing*. London: Harvard University Press.

CHAPTER 4

RESEARCH PLANNING

4.1 Preface

Research should be treated as a project, as discussed in earlier documents. All type of research needs planning, whether it is Academic, Industrial, Conceptual, Empirical, Qualitative, Quantitative, Pure or Applied. Likewise, projects research need planning to control the essential factors such as Time, Cost and Quality. People and researcher's commitment is other factors that influence the Time, Cost and Quality of a dissertation. In a project management view, Time, Cost and Quality factors have a trade-off between them. An academic researcher needs to understand those factors and develop a balanced research plan.

Moreover, a Research Design should also consider those control variables. R researcher must have a good understanding of a Research Design. Lack of awareness or knowledge of research paradigms would take research into the failed project. A Research Design requires a focused approach to logically choose the appropriate research methods based on the nature of the study. This is because, quality of research is driven by the research objectives, research questions and or theory. This paper discusses the research paradigms and how to choose appropriate research methods.

This article is compiled with a focus to develop your understanding of the research plan and Research Design. Through this article, you should be able to:

- develop a research plan
- consider the different control variables of a dissertation
- review alternative approaches to develop a research plan
- understand important consideration for a research plan
- define research methodology
- consider the various methods for research
- review alternative research paradigms and their association with the methodologies
- discuss choosing a philosophical positioning and describing the Research Design for the method selected

4.2 Introduction

Research planning is a plan that aims to control the progress of research to meet deadlines within a budget and to maintain the quality of research. For example, an academic dissertation, as a rule, has a start and a finish date that limits the duration of a thesis such as three months for full-time students and six months for part-time students. A research plan is to ensure that the dissertation is completed and submitted on or before the deadline. Moreover, a productive research program provides that the dissertation maintains the desired quality and restricts cost overrun.

A dissertation plan must follow the research aim and objectives and determine how much time should be allocated to each research objective to fulfil the purpose. Furthermore, a research plan also determines the appropriate research methodology to accomplish each objective. Nevertheless, it determines how the progress of research activities will be monitored and controlled.

4.3 Time in Research Plan

Most research is time-bound. Therefore, time is an essential leading factor for research. In an academic dissertation for Master degree courses is set based on full-time (three months) and part-time (six months) students. This distinction is configured while determining the student's commitment to study as a full-time or a part-time, basis. For example, full-time students are committed to studying eight hours a day, but some part-time students who typically have a full-time commitment elsewhere can only commit to four hours a day for study.

Secondly, the time factor is essential to determine the time taken to fulfil each objective. For example, research has four objectives

- To review the literature.
- To identify the challenges.
- To validate the challenges.
- To conclude and recommend.

A researcher has only three months to complete the dissertation. Now, research can have different options to determine the time taken to address each objective and associated activities. Some researchers may adopt the most straightforward way, that is to divide the time by the number of objectives equally. This approach is simple but is not the most viable approach to a research plan. That is because each objective demands a different set of activities to be performed. Some events may take longer time than others. For instance, Objective 1 (to review the literature), reviewing literature demands not just critical reading but also critical thinking and critical writing. While allocating time to this objective, research should consider all the activities

that are essential to fulfilling the critical reading, thinking and writing. Such as, activities for critical reading could be, developing search criteria, developing inclusion and exclusion criteria, developing a plan to use Boolean operators, storing journals and other literature and collecting information for references and bibliography. In this, some activities may take a much longer time than others.

4.4 Cost in Research Plan

In much academic research such as a dissertation, considering cost may not be an essential factor. However, it does have a significant impact in most cases. Such as industry-funded or any other funded research. The cost of a study is closely related to TIME. For instance, let's assume the cost of research is £10 per hour and the number of working hours in a week is 40. The planned time to complete a literature review is for two weeks, but the actual time taken is three weeks. In this case, the researcher has spent an extra 40 hours on a literature review. That ended with a soaring cost of £400.

Moreover, since an extra week is spent to conduct a literature review, the research is left will one week less time to fulfil other objectives. Less time devoted to other objectives may impact on the quality of work and the submission deadline. The ways to mitigate the risk of producing low quality or missing deadline is working overtime, such as increasing number of hours of working in a day and working on weekends.

4.5 Quality in Research Plan

There are no such set criteria to define excellence in a research project. However, most academic institutions have set benchmarks to measure the quality standard of your dissertation. Meeting the quality standard for a Master's dissertation is essential to gain good marks. Here the quality stands for the qualified level of literature review, adopted research methodology, analysis, discussion, conclusions and recommendations and references, etc. Examiner's look for certain aspects of your dissertation to measure the quality of the marking scheme. Most universities have a marking system standard for dissertations and internship reports. For example, some key factors considered for marking literature review is, statement of research, extent, depth, the currency of literature review, referencing, the level of criticality in agreements and disagreements, links with research objectives, a coherent structure, a concise summary and conclusion, etc. Marking scheme can be obtained from the dissertation module handbook and module leader.

The researcher's Bias also influences the quality of the dissertation. For example, a research question demands a survey with Project Managers, but a researcher chooses Quantity Surveyors for interviews. It is just because the research knows a few Quantity Surveyors. The data collected by the researcher may not fulfil the requirement of objective and would impact the quality of data analysis and conclusions. Similarly, using journal articles older than ten years will not provide the current school of thought on a topic, and

consequently, it will not be on the expected standard. The low quality of work gains lower grades and often asked for resubmission.

4.6 Influence of People and Commitment to Control Factors

The researcher and academic supervisor are the primary input for university research. A student should develop a research plan and agree with the supervisor. Each supervisor has a different style of supervising research. A supervisor acts as a guide and monitors the progress of a dissertation. The supervisor also provides feedback to ensure that the dissertation maintains the desired quality standards. A successful project needs the commitment of all the people involved in the research. A researcher is a leading resource for the dissertation. Therefore, a student must be fully committed to the research project. It is also essential to gain the commitment of respondents. The responsibility of respondents helps a researcher to collect rich data that ensures the quality of validation of underpinning research findings and conclusions. If respondents are not committed to research, they may delay the responses or may provide undesirable data. The respondent's commitment relies on how interested they are in your research. The commitment of interviewees can be gained by developing trust and developing relationships with them. Following principles of research ethics is useful to establish relationship and confidence with respondents. Research ethics is discussed earlier document CHAPTER-1: Introduction to Research.

4.7 Essential Considerations for Research Plan Development

Along with control factors, a research program compilation should consider all critical and non-critical activities. The activities to be undertaken within each objective must be a reasonable breakdown. However, having a long list of events would not be useful, it is also unhelpful to have omnibus activities, that has many things in it.

Logically sequencing the activities is essential. The questions to ask are: which activities must come before, which activities must follow, moreover, which may occur at the same time? For example, objective three above, "to validate the challenges" demands interviews with industry experts. Satisfying the demand for this objective may require a logical sequence is given in Example 2. It is up to a researcher, how that sequence is logically defined. Likewise, in Example 1, there could be more than one logical sequence to fulfil this objective. After sequencing, a realistic duration of each activity should be determined. In the end, if the time requirement overall exceeds the amount of time available (three months) for completion of the dissertation, the aim and objectives should be reconsidered.

1. Literature review
2. Prepare questionnaire
3. Recruit respondents
4. Conduct interviews
5. Prepare data transcript
6. Input data in NVivo
7. Analyse results
8. Write analysis chapter

Example 2: Logical Sequence of Activities

A researcher must also determine the resources available and other controls. For example, a researcher is planning to send a survey questionnaire in August 2018. In the UK, that is the time when most of the

people are on holidays due to school summer holidays. Targeting respondents at this time will result in a low response rate. The situation might be the same during Easter and Christmas breaks. Moreover, seeking periodic feedback from the research supervisor is essential to avoid last-minute panic and risk of rework. Make sure to book appointments with the supervisor in advance while agreeing on the research plan.

4.8 Planning a Research

Research planning is to identify priorities and milestones. Preparing a research programme needs careful and continuous planning. The research plan should be as simple as having too many details on a research plan makes it complicated. The future is uncertain. Therefore, a research plan must be flexible to adapt to any uncertain changes. To adopt changes flexibly a plan, require float or slack. Afloat or slack is the amount of time an activity can be delayed without causing a delay to subsequent activities. Regularly updating the research plan avoids the risk of any surprises, uncertainties or contingencies.
A general research plan is given in Figure 1, adapted from Hammond (2007). Given the research process in Figure 1 is generic and may be suitable for most academic research to some extent, but not necessarily.

This research process model in Figure 1 below represents an example of Inductive and Deductive research approach with theory building and theory testing phases (see section 2 of Chapter-1). *You must note, this is a model of a research process and does not represent activities to fulfil all research objectives.* The first step 1.0 is to critically review the literature for theory building that helps to formulate the aim and objectives and research hypothesis (theory). Afterwards, it suggests preliminary review (see section 4 of Chapter-2) of the subject area supports the theory with current views of other researchers. The initial literature review leads to the synthesis of the literature to bring out a theoretical model or a conceptual framework in step 2.0 (see section 6 of Chapter-1).

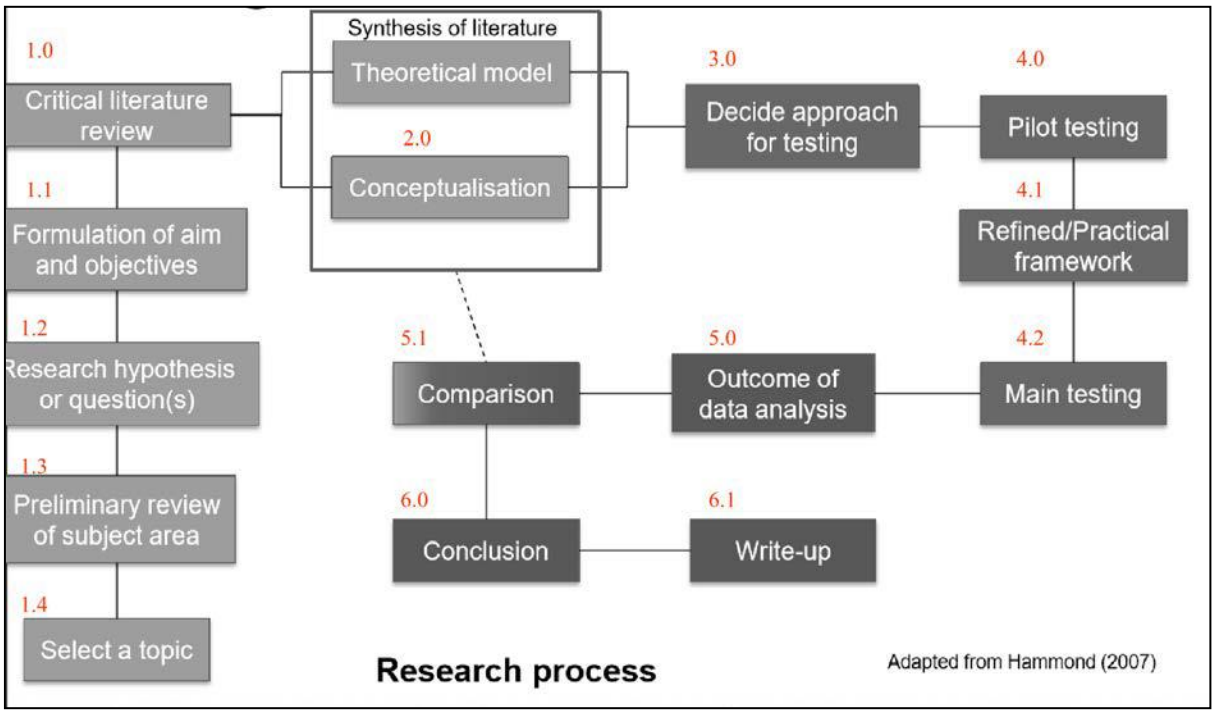


Figure 1: Example of a Research Process

A defined theoretical model needs deciding the appropriate approach (such as Qualitative or Quantitative or both) for testing the model. Step 3.0 is to develop the proper research methodology that fulfils the aim and objectives of the research. Once the research methodology is decided, it needs pilot testing. Pilot testing is a small-scale trial of data collection to identify if there are any errors or issues in the items such as questionnaire, nature of data or data analysis tools and techniques. If there are any issues, the research framework needs fine-tuning or refining. Once refined, the final testing is done, and conclusions are drawn while comparing the main findings from the literature review against the results from data analysis. While developing a research process, each step or sub-step presented in Figure 1 above can have several activities.

4.9 Presenting a Research Plan

There are several ways to develop or present a research plan such as Gantt Chart, Network Diagram and Timeline. Some researchers use simple diagram technique that is an inbuilt feature in **Microsoft Word** and **Microsoft PowerPoint**, called SmartArt and Shapes. However, SmartArt Shapes are not very flexible to represent a research plan. The other efficient substitutes are **Microsoft Excel** for Gantt Chart, **Microsoft Project** for Network Diagram, Gantt Chart and Timeline and **Microsoft Visio** for different types of Diagrams. This three software can be used as a standalone system to compile a research plan or can integrate the data. For example, raw data can be inserted in Microsoft Excel and then imported in Microsoft Project and Visio or vice versa. Below figure exhibits a simple example of the Gantt Chart. This example exhibits the activities that are related to data collection through survey questionnaires and interviews. This example is for illustration purposes, as each research is unique and can have different activities. However, this case does not represent a research process, likewise in Figure 1.

#	Name	Duration	Start	Finish
1	LITERATURE REVIEW	130.0 d	26/02/2014	26/08/2014
2	**DATA COLLECTION QUESTIONNAIRE**	**28.0 d**	**26/02/2014**	**04/04/2014**
3	SEND QUESTIONNAIRES	7.0 d	26/02/2014	06/03/2014
4	RECEIVE RESPONSE	25.0 d	26/02/2014	01/04/2014
5	DATA ENTRY IN EXCEL	26.0 d	27/02/2014	03/04/2014
6	ANALYSE RESPONSE	20.0 d	10/03/2014	04/04/2014
7	**INTERVIEWS**	**90.0 d**	**07/03/2014**	**10/07/2014**
8	ARRANGING INTERVIEWS	90.0 d	07/03/2014	10/07/2014
9	TAKING INTERVIEWS	30.0 d	12/03/2014	22/04/2014
10	COLLECT ARCHIVE DATA	28.0 d	12/03/2014	18/04/2014
11	CONVERTING AND ANALYSING DATA	40.0 d	12/03/2014	06/05/2014
12	**VALIDATE FRAMEWORK**	**25.0 d**	**26/05/2014**	**27/06/2014**
13	SEND MODIFIED FRAMEWORK	5.0 d	26/05/2014	30/05/2014
14	RECEIVE RESPONSE	10.0 d	26/05/2014	06/06/2014
15	ANALYSE DATA & WRITE REPORT	15.0 d	09/06/2014	27/06/2014
16	WRITING UP THESIS	60.0 d	27/06/2014	18/09/2014
17	SUBMISSION	1.0 d	19/09/2014	19/09/2014
18	VIVA	3.0 d	12/11/2014	14/11/2014

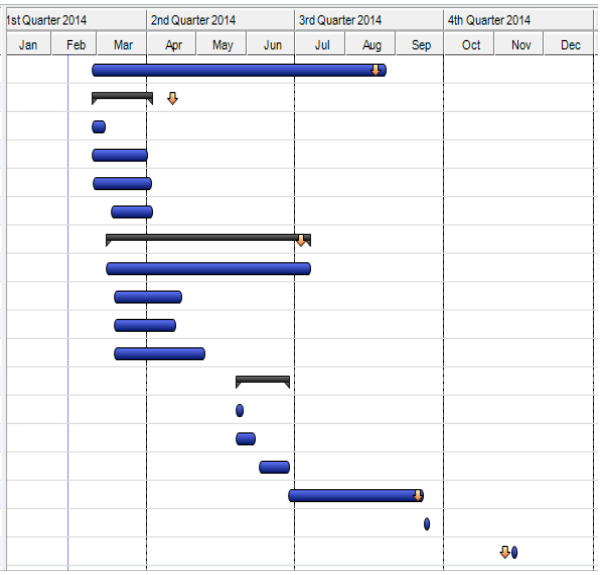


Figure 2: Example of a Gantt Chart of a Research Process

The difference between both examples in Figure 1, illustrates the general research process that does not have specific activities for each task. In comparison, the example in Figure 2, given details of actions needed to perform each task, this also represents the duration (in days) of each task such as a start date and finish date. Same information such as start date, end date and length can be represented through the network diagram in Microsoft Project. However, for compiling a simple research process, Microsoft Visio would be the right choice.

Below are some useful links to YouTube videos for developing a Gantt Chart and a Process Map.

https://www.youtube.com/watch?v=sA67g6zaKOE

https://www.youtube.com/results?search_query=gantt+chart+in+project+2010

https://www.youtube.com/watch?v=Dbpx-92Xt5g

4.10 Activity

Develop a logical order (1 to 12) of activities given in box below.

☐ Prepare questionnaire	☐ Conduct interviews
☐ Prepare NVivo for data input	☐ Literature review
☐ Develop a research methodology	☐ Write analysis chapter
☐ Ethical approval	☐ Prepare data transcript
☐ Interpret results	☐ Input data in NVivo
☐ Recruit respondents	☐ Analyse results

Once you have a logical order of activities given in box 1, assign the duration to events as given below.

Duration for activities-	1, 3, 5 and 7 is	10 days
Duration for activities-	2, 4, 9 and 12 is	5 days
Duration for activities-	6, 8, 10 and 11 is	3 days

Let's assume; each activity starts after the previous activity ends. For example, activity (1) starts on day 1 and the duration of activity (1) is 10 days, the activity (2) will start on the day 11 that has a duration of 5 days. Next activity (3) will start on the 10 + 5 = after 15th day. Following the same pattern, draw a Gantt Chart and find the end date if the start date is 1st January 2018. Feel free to use the software of your choice.

You are asked to conduct Industrial research. Your simple hypothesis is *"The government policies have failed to address the need of affordable housing in England and Wales."*

See Figure 1, Example of Research Process, by Hammond (2007), develop a list of tasks that may involve in your research process.

CHAPTER 5

RESEARCH DESIGN

5.1 Preface

A dissertation aims to satisfy its aim and objectives. Achieving the aim and objectives is a systematic process. The dissertation process needs careful research, planning and design. Research Design means planning for a systematic process for your research to achieve the aim and objective. A Research Design requires a focused approach to logically choose the appropriate research methods based on the nature of research such as Conceptual, Pure, Applied, Industrial. This is because, nature of research drives, the research objectives, research questions and any theories or hypothesis. Different type of research methods or research approach could be required to satisfy the demand of each research objective. Some objectives may need more than one way to investigate the topic. As discussed in DLM- RM-1, the most academic research adopts mixed methods that involve Inductive & Deductive and Qualitative & Quantitative. However, not all research needs to choose both the Qualitative & Quantitative approach as that is based on the decision about what path is the most suitable to fulfil the objective. There have been several frameworks suggested that helps to decide the choices of research methods. However, only a couple of frameworks is widely used, such as 'The Research Onion' and 'The Nested Model'. Both frames have not much difference between them. Before analysing, comparing and adopting those frameworks, it is essential to understand the purpose of research.

5.2 Purpose of Research

The purpose of the research is to anticipate the intended outcome of the research. The use of adopting a research methodology framework is to determine the most appropriate choices that satisfy the research aim and each objective. For example, below are the aim and objectives of a research

Aim: The research aims to develop a framework for the adoption of Building Information Modelling (BIM) by Small and Medium Enterprises (SMEs) in the UK construction industry.

Objectives:

- To investigate the current practice and theory of BIM in the UK construction industry, and particularly in SMEs.
- To critically examine the essential factors that influence the UK construction SMEs to adopt BIM.
- To validate the essential factors that affect the UK construction SMEs to adopt BIM.
- To develop a framework for the adoption of BIM by the UK construction SMEs.

Since a research aim and objectives are established, a Research Design is a process undertaken to ensure that each one of the above four objectives is fulfilled to satisfy the aim of the investigation.

In this example, the overall purpose of the research is to develop a framework for the adoption of BIM in the UK construction SMEs. Each objective serves a different purpose that fulfils the aim of the study.

The first objective seeks to investigate the latest understanding through literature review. That means, the purpose of the first objective is to develop the current knowledge of the topic area. As discussed in CHAPTER-1 and 2, the literature review is demanded a different type of research such as Conceptual, Academic, and Pure research. For this research, the purpose of literature is to develop the current understanding of the BIM and the current practice of its adoption. The literature review here lays the solid background for the framework development and opens the doors to fulfil further objectives.

The purpose of the second objective is to critically examine the essential factors that influence the UK construction SMEs to adopt BIM. This objective aims to investigate the factors that are identified in the literature review critically. As discussed in CHAPTER-3, critically examine here is the logical investigation of those factors while utilising skills such as through critical reading, critical thinking and analytical writing, to draw the logical conclusions such as similarity, differences and more. Also, it may build a new theory that needs testing.

Objective four is set to validate the factors that are examined to fulfil objective three. Validating those factors can adopt different approaches such as Qualitative or Quantitative or both. A researcher must understand the best choice based on the trade-off between, Time, Cost and Quality (as discussed in CHAPTER-4, part 1). For example, conducting interviews may consume less time instead of the survey questionnaire. However, conducting interviews may be a costly choice because of travelling or fieldwork.

Moreover, fewer interviews due to time restriction, might not provide rich data and that will have a direct impact on the quality of outcome, in this case, the quality of final objective, to develop the framework. That means the quality of any of the objective is to be compromised will have a direct impact on the outcome. In other words, the research will not serve the actual purpose. Therefore, to maintain the quality of research, an efficient Research Design is essential.

5.3 Research Design

A Research Design is an overall strategy that a researcher chooses to fulfil the demands of research objectives. A good design is often flexible, appropriate, efficient and economical. Generally, the Research Design is to minimise the researcher's bias and to maximise the reliability of the data and analysis. The design that reduces the possibility of errors is considered the best plan.

Similarly, a design that helps to capture a significant number of data and provides an offers investigation through different dimensions are seen as the most appropriate and efficient design. However, that all depends on the research problems, hypothesis and research purpose. Thus, the right Research Design is linked to the primary purpose or research objective to the main problem and besides, with the nature of

the study (such as Industrial, Applied, Conceptual, Pure). Each Research Design is unique because that is developed to serve a unique purpose. A design may be appropriate in other cases but may be found inadequate in a different research context. Thus, one single design will not serve the purpose of all research objectives or problems in other studies. For example, if you adopt a Research Design from a closely matching existing study, it may be appropriate to serve the purpose of your research but to a small extent. That is because your research problem or research objective would be different from that study.

An adopted Research Design would be appropriate for your research to some extent that usually involves similarities such as the means of obtaining data/information; such as literature review, interviews and questionnaire, the use of skills of the researcher; such as critical writing, paraphrasing, NVivo and SPSS, closely matching research objective that serves a similar purpose; such as

- developing a framework,
- the nature of the problem to be studied,
- the scope of research; such as respondents and industry,
- the availability of time and cost for the research work; such as three months period to complete a dissertation.

However, even if a Research Design is adopted or look similar to many other studies that still would have some unique elements that are based on the uniqueness of purpose of research, the purpose of objectives, the particular nature of research scope and different skills of researchers. A research methodology framework has several different choices that can have different strategies based on the above stated unique elements of research.

5.4 Research Methodology Frameworks

As mentioned above, 'The Nested Model' and 'The Research Onion' is the widely used frameworks in academic studies. Both frameworks serve the purpose of a Research Design. The contents of both frameworks are the same but have some differences in presentation.

The Nested Model is originated by Kagioglou et al. (1998) that presents three main elements, Research Philosophy, Research Approach and Research Techniques (Figure 3: The Nested Model Framework). The nested approach is a structured research technique. For a Research Design, the prime focus in on defining the research philosophies. The research philosophies guide the further choices. In The Research Onion,

Saunders et al. (2009) presented six (6) layers, as shown in Figure 4: The Research Onion Framework also considers the research philosophy as the primary element to define.

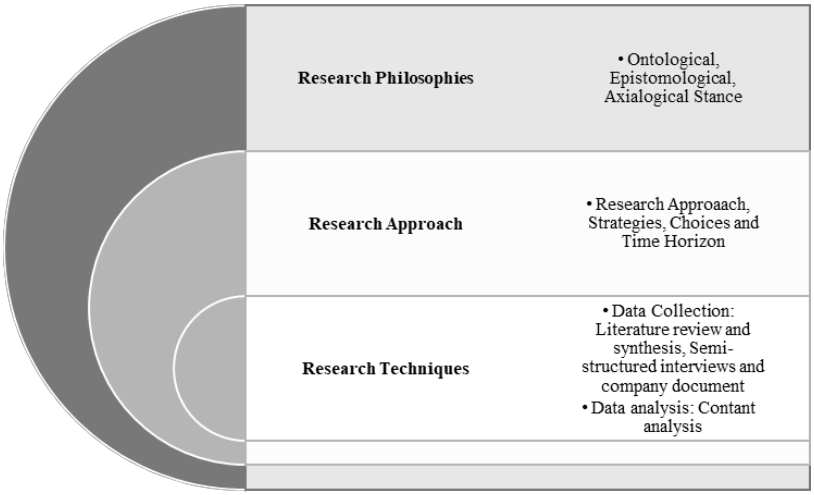


Figure 3: The Nested Model Framework

Source: Adopted from Kagioglou et al. (1998)

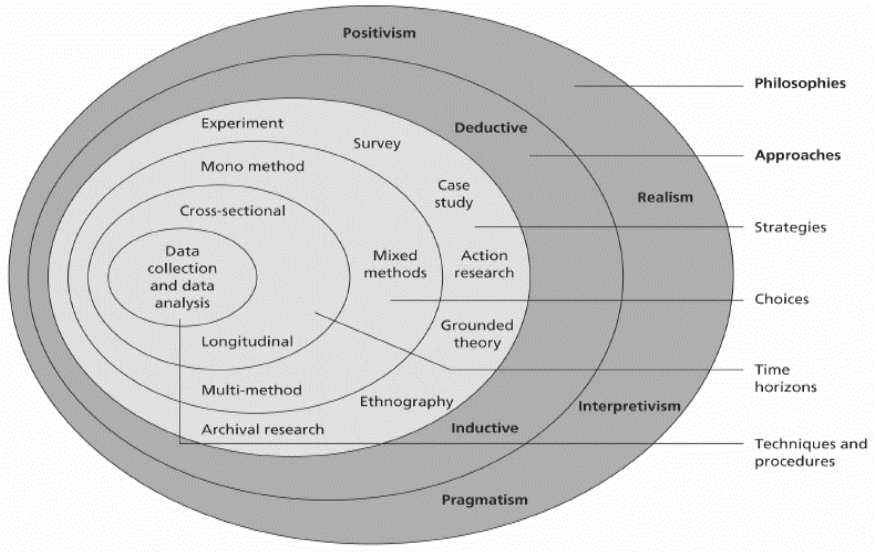


Figure 4: The Research Onion Framework

Source: Saunders et al. (2006)

Naming this framework as 'Research Onion' is to provide an understanding that the research is a systematic process. Like an Onion, a Research Design needed peeling layers by layer to discover new information under each layer and finally reaching to the core of onion where the solution lies. However, that is just a philosophy. The Research Onion has six layers, Research Philosophy, Approach, Methodological Choice, Research Strategies, Time Horizon and Research Techniques & Procedures as presented in above Figure 4. Each of those layers represents different choices in which one or more options can be adopted as demanded by research objectives. Having multiple layers in this framework also serve that the research should not jump any layer while defining the methodological choice. Choices should be determined systematically while moving from the outer layer to the core layer.

Both models are almost similar. Still, the main difference is the research approach explained in The Research Onion (Saunders et al., 2007) is also placed in the research strategy, the research choice and the time horizon. On the other hand, in the Nested Model, Kagioglou, et al., (1998) and Sexton (2000) contended that the research choice and the time horizon should not be driven by research strategy. Lewis et al. (2009) conceptualised the research structure into the form of an 'onion'. To carry out research that will fully answer the research objectives, the research 'onion' provides a clear framework. The onion offers a correlation for peeling away layer after layer before an effective research strategy and design is selected. However, there is a criticism in that it fails to establish its influence on the selection of a methodology through the research question and objectives.

In comparison, the Nested Model only has three layers. In Kagioglou' s view, the research strategies, the research choices and the time horizon should fall into the research approach. However, Saunders expressed research strategy, preferences and time horizon as the separate activities/layers of a research methodology. In a comparison of The Research Onion and the nested approach (Keraminiyage, 2009), despite the commonalities in both research methodological frameworks, The Research Onion differs from the nested approach. Moreover, the selection of the research approach differs.

The 'nested approach' and the 'research onion' both give a similar understanding of the components of the research methodology and gives guidance for research. In the 'nested approach', the outermost ring is the research philosophy, which is similar to the presentation in the 'research onion', and is based on the Epistemological, Ontological and axiological assumptions of the researchers. The middle ring consists of the research approach to organising research activities, including the research approach, strategies, choices and time horizon. The innermost circle is the same for the two frameworks and represents the research techniques. However, establishing choices for research depends on the research paradigm.

5.5 Research Paradigm/Methodology

A Research Paradigm is a framework comprising an accepted set of theories, methods and ways of working. At the philosophical level, it is used to reflect fundamental beliefs about the world and research. At the operational level, it is used to provide guidelines about how the researcher should conduct research. The research paradigm is to establish rational and operational choices for research. A research methodology has several variants. However, the two most essential paradigms are the Phenomenological and Positivist. Phenomenological position compliments with Qualitative and Positivist with Quantitative Research.

The choice of philosophy provides a means of underpinning the research methodology and research strategies. Saunders et al. (2009) encouraged two significant ways of thinking about research philosophy, 'Ontology and Epistemology'. The theory of knowledge, called Epistemology that draws assumptions about what and how people know things, and what kind of knowledge is the right knowledge. The Ontology is the debates on what reality is and what types of phenomena are real. An excellent Research Design is all about how well it reflects upon the rational choices. The first layer of both The Research Onion and the Nested Model is to establish the philosophical choices that provide an insight into Research Design. Pearson's Web Dictionary (2013) defines research philosophy as an "overarching term relating to the development of knowledge and the nature of that knowledge concerning research." However, research and philosophy both have their definitions.

The WordWeb Dictionary provides the following definition "Research is a logical investigation to establish facts", and philosophy is "The realistic investigation of questions about the existence of knowledge and ethics."

Based on other definitions, this study clarifies research philosophy leads to a systematic, organised and impartial investigation of find answers and to establish facts about the existence of knowledge.

5.5.1 Ontology, Epistemology and Axiology

The Epistemological, Ontological and Axiological assumptions guide the search for knowledge in a study and thereby influencing the selection of appropriate Research Design. In general, Epistemology is to establish **'how we know, something'**. What is a reality, and how knowledge should be acquired and accepted? The Ontology establishes the assumption about the reality of 'what knowledge is'. Axiology is the assumptions about the value system. Burrell & Morgan (1979) has given three central debates in philosophical assumptions.

- The nature of reality: Is reality was given or a product of the mind? (Ontological)

- It is the relationship of the researcher to that researched: Must one experience something to understand it? (Epistemological)
- The role of values: Is the research "bias-free" or "bias-laden"? (Axiological)

I. Ontology

WordWeb Dictionary defines; Ontology represents the metaphysical study of the nature of being and existence. Assumptions are the hypothesis or statement that is assumed as accurate and from which the conclusion is drawn. In Ontological Assumption, Objectivism and Subjectivism describe a continuum polar opposites with varying philosophical positions aligned between them (Creswell2013). This enables a researcher to claim about what knowledge is and how it is being constructed (Creswell 2013).

For example- Subjectivism holds that a particular statement can be true or false, based on the **mental knowledge (Phenomenology)** of two persons. For instance, Tom has a view that the current UK government is capable of securing a good deal from Brexit negotiations. However, Eva does not agree with this opinion and states that the opposition party is much capable of negotiating and ensuring a better deal from the EU. Both statements contradict and are debatable. Objectivism demands concrete evidence from the **physical world (Positivist)** instead of mental knowledge. Both Tom's and Eva's theories need real evidence to prove the opinion through investigation or a study.

Therefore, the Ontological position of research to understand and establish that is the research idea is the reality that is a projection of human imagination, or the truth is originated through a concrete structure. Figure 5 presents the core Ontological Positions about the nature of reality.

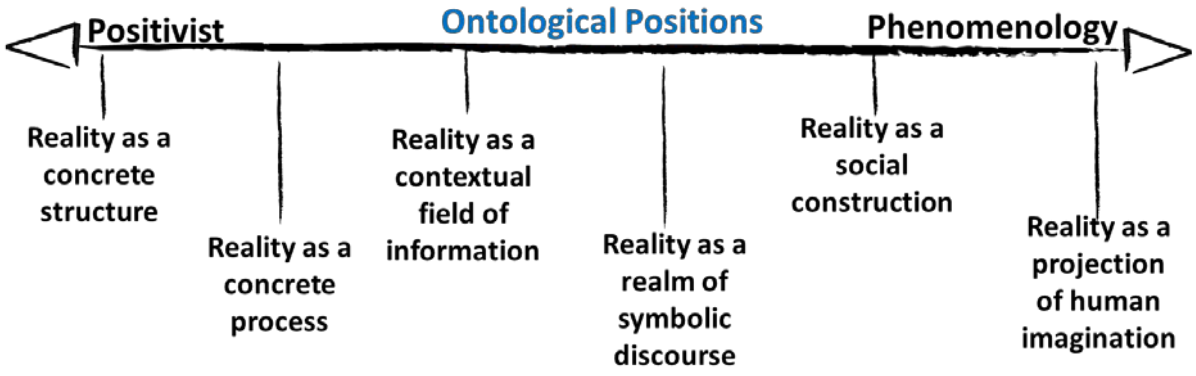


Figure 5: Continuum of Core Ontological Assumptions

In Figure 5 the two sides of continuum present Phenomenology (mental world) that represents that research theory, issue, problem or hypothesis is the imagination of the researcher. Moving from Phenomenology to Positivism (physical world) gives the understanding of how the reality is evidenced. For example, the reality socially constructed that could mean the research theory or hypothesis is built by the combined view of a group of humans instead of the imagination of one person. If a researcher moves further towards positivism on this continuum that means the idea needs robust evidence that has a contextual field of information, a

detailed process and concrete structure. It is not to say that the researcher who philosophically leant towards Subjectivism is wrong.

II. Epistemology

Epistemology is the philosophy of the study or a theory about the nature of that establishes the grounds of knowledge.

Stanford Encyclopedia of Philosophy defines Epistemology as "the study of knowledge and justified belief".

The Oxford Dictionary defines it as "the theory of knowledge, concerning its methods, validity, and scope, and the distinction between justified belief and opinion."

Epistemology seeks an answer to the fundamental question: is the current knowledge correct/adequate or false/inadequate knowledge. Burrell & Morgan (1979) given two different views of Epistemology, those are Positivism and Anti- positivism (Interpretivism).

The below Figure 6 suggests that Positivists believe that one can seek to explain and predict what happened in the social world by searching for pattern and relationship between them. However, Anti-positivism (Phenomenology) rejects the theory of positivism and argues that reality is relative and various based on this tradition any research could have multiple realities whereas, Positivist contends that reality must be tested through a robust process and concrete structure. Knowledge generated from interpretive paradigm comprehends as socially constructed and subjective interpretations (Greener 2008; Creswell 2013). Whereas, Positivist claims that a researcher should be independent of research and the knowledge is created through the physical world. Unlike, in Phenomenology paradigm, the knowledge can be set up by a researcher while being a part of the research.

Figure 6: Continuum of Core Epistemological Assumptions

III. Axiology

Axiology is the philosophy about determining the value of the researcher in research. The Figure 7 below represents the two choices. If a research paradigm is Phenomenological where the researcher is a part of the investigation (as established in Epistemological Position), the research would have influenced by the values of research and is biased. On the other side, if the research paradigm is Positivist, it is most likely that the investigation is value-free and unbiased. Simply, the assumptions made in Axiology is to determine that if the researcher influences the study such as outcomes, interpreting data analysis, data collection in one or more ways. However, if the Positivist paradigm is chosen that falls into the Deductive approach, it is debatable that it is still influenced by a researcher while observing and confirming stages as discussed in section below.

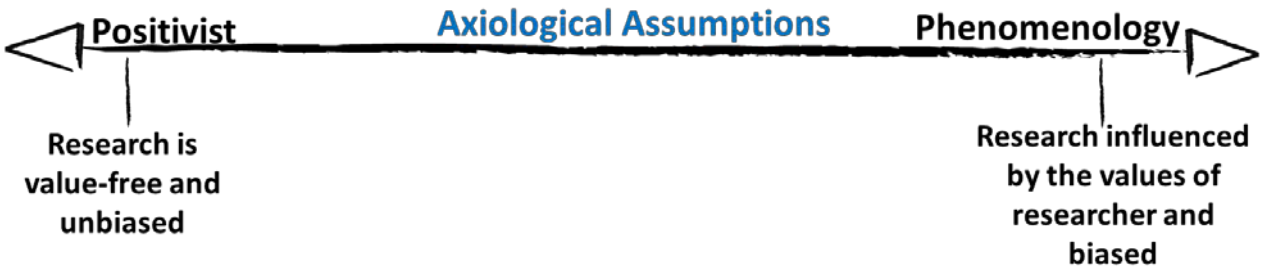


Figure 7: Continuum of core Axiological Assumptions

5.6 Research Approach

Gill and Johnson (2002) argued that the Deductive approach to research has become synonymous with positivism, while the Inductive approach with social constructionism (Phenomenology). The Figure 8 below represents the two paradigm's of logical approaches, Inductive and Deductive. As discussed earlier in CHAPTER-1, the Inductive approach is developing theory through observation, forming a pattern and through establishing a tentative hypothesis from literature review and interviews that fall into Qualitative methods. On the other side, the Deductive approach is considered a Positivist paradigm that helps to test the theory through hypothesis testing, observing and interpreting data and trends and confirming the theory through further evidence. Theory testing uses a Quantitative method that has a process and concrete structure.

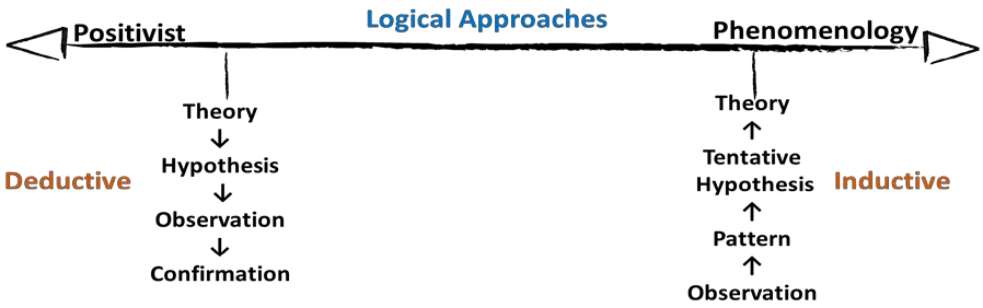


Figure 8: Continuum of Logical Approaches

5.6.1 Research Methods

The research methods bring focus to the research approach. A research method refers to the ways to conduct the research. This consists of a range of strategies available. Saunders et al. (2009) argue that no research strategy is superior or inferior to any other. The research objectives and established philosophical choices drive a research strategy. Saunders et al., (2009) and Denscombe, (2007) given strategy for social research namely, Surveys, Case Studies, Experiments, Ethnography, Phenomenology, Grounded Theory, Mixed Methods and Action Research. The Figure 9 below represents different research methods and its positioning based on the research paradigm. In the Phenomenology/Anti-positivism paradigm that supports Qualitative data and Inductive approach to research, can choose one or more methods such as ethnography, grounded theory or archival research. Those methods have the significant influence of

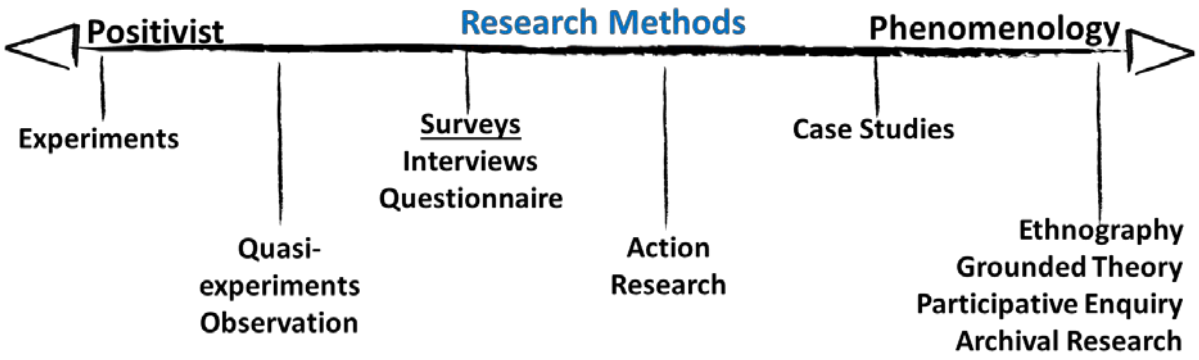


Figure 9: Continuum of Core Research Methods

researcher and biased. For example, ethnography is a study of culture that is initiated in the biological, social and cultural research (Denscombe, 2007). The observations relate to social and cultural processes can have a strong influence on the researcher.

Since the Anti-positivism compliments with the Inductive approach; it uses grounded theory and archival research methods to develop a broader generalisation from a specific observation. Moreover, a researcher can have a significant influence on case studies and action research. This is because, action research can be situational research in which the researcher takes part in the implementation of the findings, and continuously evaluates and adjusts the study and practice. The theory testing (Deductive approach) does not demand the researcher to solve any practical problems while being involved in the situation.

On the other side, the Positivist paradigm supports Deductive approach to test the theory. This is also called a top-down approach. Theory testing helps Qualitative data that compliments with experiments. Experimental research is an objective, systematic and controlled investigation for predicting and examining

probability and causality among chosen variables (Johansson, 2003). Empirical research is more suitable for investigating cause and error and examining the likelihood and causality among selected variables. That variable is provided by the Quantitative data that can be collected through a survey questionnaire.

5.6.2 Methodological Choices

Following the above discussion, Figure 10 below represents the relation between, Ontological Positions, Epistemological Positions, Axiological Assumptions and Logical approaches of Positivism and Anti-positivism.

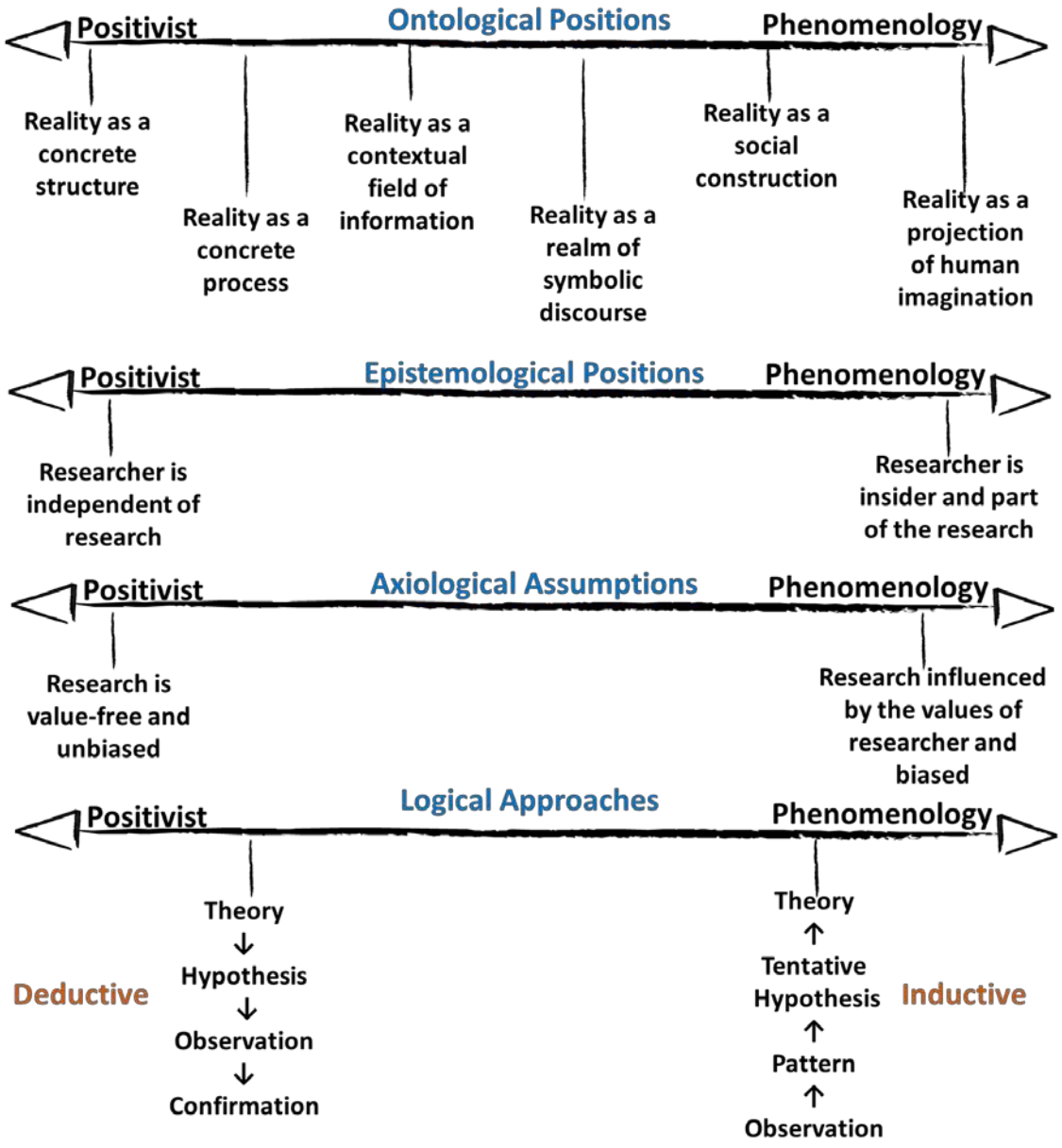


Figure 10: Methodological Choices

This figure exemplifies the overall summary of the above discussion about the research paradigm and the philosophical stand of a researcher based on the paradigms.

5.7 Summary

The two most crucial paradigm Positivist and Anti-Positivist in Figure 10 gives the overall sense of the appropriate choices. In a recap, if an Ontological position of research is leant towards Phenomenology or Anti-positivism that establishes the reality is the imagination of a human or socially constructed, then there is a high probability that the researcher is the part of the research and the research is influenced by the research's value and is biased. Anti- positivism is mostly leant towards the Inductive approach where the research has a theory, and that is originated through observation and by the senses. In that, the research has a tentative hypothesis. This type of the investigation relies on the social constructivism that analyses the Qualitative data (that is not entirely structured or semi-structured) to understand the opinion, experience, ideas of a community of practice or a focused group. The grounded theory, archival research, case studies and interviews are the standard methods if a philosophical position is towards Anti-positivism. On the other side, Positivist uses experiments through structured Quantitative analysis. The approach to conducting a structured experiment that follows a robust process. The Figure 11 below exemplifies a recap of the difference between the Positivist and Anti-positivism Paradigms.

	Positivist paradigm	vs	Phenomenological paradigm
1.	The world is external and objective Observer is independent Science is value free	vs	The world is socially constructed and subjective Observer is part of what observed Science is driven by human interests
2.	Deduction	vs	Induction
3.	Look for causality and fundamental laws Focus on facts Reduce phenomena to simplest elements Formulate hypotheses and then test them	vs	Try to understand what is happening Focus on meanings Look at totality of each situation Develop ideas through induction from data
4.	Operationalise concepts so that they can be measured Taking large samples	vs	Use multiple methods to establish different views of phenomena Small samples investigated in depth or over time
5.	Explanation via analysis of causal relationships and explanation by covering-laws (etic)	vs	Explanation of subjective meaning systems and explanation by understanding (emic)
6.	Generation and use of quantitative data	vs	Generation and use of qualitative data
7.	Use of various controls, physical or statistical, so as to allow the testing of hypotheses	vs	Commitment to research in everyday settings to allow access to and minimise reactivity among the subjects of research
8.	Highly structured research methodology to ensure replicability of 2, 5, 6 & 7	vs	Minimum structure to ensure 5, 6 & 7 (and as a result of 2)
	Quantitative /Nomothetic	Methodology	Qualitative/Ideographic
Methods	Laboratory experiments	Quasi-experiments	Surveys	Action research	Case study	Ethnography

Figure 11: Positivism v Anti-positivism

In academia, most research adopts mixed methods, for example, the research objectives (given under above headline 5),

Objectives:

- ***To investigate the current practice and theory of BIM in the UK construction industry, and particularly in SMEs***- this objective demands literature review and archival research that falls into Quantitative studies. To fulfil this objective, the researcher is building the theory while observing the views of other authors. Observing the views, ideas or opinion of other people, a group of people or a community of practice is to generalisation through Qualitative means. This objective demands Deductive approach.
- ***To critically examine the essential factors that influence the UK construction SMEs to adopt BIM***- this objective can be fulfilled through adopting an Anti-Positivist philosophy, whereas, literature review, observation, archival research, case study and survey methods can be taken. This objective demands Deductive approach.
- ***To validate the essential factors that affect the UK construction SMEs to adopt BIM***- this objective specifically demands validation of the essential factors that are established earlier through objective 1 and objective 2. A researcher can choose an experiment that is a structured approach and used Quantitative data or unstructured or semi-structured interviews to validate the factors. Fulfilling this objective demands Inductive approach.
- ***To develop a framework for the adoption of BIM by the UK construction SMEs***- this objective is the concluding objective that is to fulfil the aim of the research with the help of the above three objectives. However, the conclusions and recommendations at the end also require concrete evidence from the literature review, even though multiple methods have been used to validate the findings.

Finally, no research choices are wrong if justified. A researcher may choose to conduct a Qualitative & Quantitative study or Inductive & Deductive or both approaches. To fulfil the aim ***"to develop a framework for the adoption of BIM by SMEs in the UK construction industry"*** above four objectives could adopt both Qualitative & Quantitative research or Inductive & Deductive approached. This aim can also be fulfilled by adopting multiple research methods. However, a researcher must justify the choices with valid critical discussion and evidence. Therefore, a Research Design must be clear, accurate and a systematic process. As discussed above, the options rely on the resources available such as the control variables- Time and Cost. A researcher should determine the limitations and wisely develop a Research Design based on the resource limitations such as limited time for three months for a Master's level dissertation.

5.8 Activity

The aim and objective of the research are given below.

Aim: The study aims to investigate and document the challenges of lean implementation in construction SMEs in 2017 and build upon current project management strategies to advance current best practice guidance.

The following objectives have been set to achieve the aim of the research.

Objectives:

1. To carry out a critical review of the literature into the challenges of lean implementation in construction SMEs within England;
2. To carry out a critical review of the best practice frameworks currently in place to assist Project Managers with DITP;
3. To evaluate whether the challenges of lean implementation in construction SMEs within England are prevalent;
4. To conclude and provide recommendations which will advance current lean implementation practice guidance in construction SMEs within England.

What will be your Ontological position for the above objectives? Select the appropriate answer.

Objective 1;	☐ Positivist	☐ Anti-Positivist
Objective 2;	☐ Positivist	☐ Anti-Positivist
Objective 3;	☐ Positivist	☐ Anti-Positivist
Objective 4;	☐ Positivist	☐ Anti-Positivist

What will be the most appropriate research approach for the above objectives? Select the Appropriate Answer.

Objective 1;	☐ Inductive	☐ Deductive	☐ Both
Objective 2;	☐ Inductive	☐ Deductive	☐ Both
Objective 3;	☐ Inductive	☐ Deductive	☐ Both
Objective 4;	☐ Inductive	☐ Deductive	☐ Both

What research methods will you adopt to fulfil the above objectives? Select the appropriate choices.

Objective 1	Objective 2	Objective 3	Objective 4
☐ Case Studies	☐ Action Research	☐ Grounded Theory	☐ Experiments
☐ Ethnography	☐ Quasi-experiments	☐ Participative Enquiry	☐ Archival Research
☐ Participative Enquiry	☐ Participative Enquiry	☐ Case Studies	☐ Grounded Theory
☐ Quasi-experiments	☐ Grounded Theory	☐ Quasi-experiments	☐ Questionnaire
☐ Action Research	☐ Interviews	☐ Ethnography	☐ Action Research
☐ Experiments	☐ Experiments	☐ Archival Research	☐ Participative Enquiry
☐ Interviews	☐ Case Studies	☐ Experiments	☐ Quasi-experiments
☐ Grounded Theory	☐ Archival Research	☐ Questionnaire	☐ Case Studies
☐ Questionnaire	☐ Questionnaire	☐ Interviews	☐ Ethnography
☐ Archival Research	☐ Ethnography	☐ Action Research	☐ Interviews

Draw a process diagram for your Research Design of each objective that represents below paradigms and its contents.

- Ontological Position
- Epistemological Position
- Axiological Assumption
- Logical Approaches
- Research Methods/Strategies

Reading List

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CHAPTER 6

QUALITATIVE DATA ANALYSIS AND EVALUATION TECHNIQUES

6.1 Preface

Data analysis is a critical task for a research project. Data analysis merely is analytical thinking of an investigation of the parts of data. The two most important type of information is Qualitative and Quantitative. As discussed earlier in section 3 of Chapter-1 and section 7 of Chapter-4, that both Qualitative and Quantitative data differ by the nature of data such as non-numeric or numeric. The non-numeric is Qualitative data that helps to capture the ideas, opinion and perception of people on a complex issue. Whereas, Quantitative data is more about numeric analysis to establish facts through figures. Since both Qualitative and Quantitative are two ends of a continuum and has a different type of data, those have various data analysis tools and techniques. Moreover, the methods for both Qualitative and Quantitative data analysis differs from theory building and theory testing.

This chapter would help you to

- Develop a better understanding of Qualitative and Quantitative research
- Understand the different approaches for conducting Qualitative and Quantitative research
- Have in-depth knowledge of Qualitative and Quantitative research design, collect data, analyse, draw conclusions to write your research report

Data Analysis and Evaluation Techniques

6.2 Introduction

Data analysis is a systematic process of conducting a statistical or logical analysis to describe, explain, illustrate and evaluate the information. Data analysis is used for generalising the different or similar viewpoints of people or developing a specific point of view. Different type of research such as Conceptual or Empirical, Pure of Applied, Industrial or Academic can demand one or more type of data analysis. The two main types of data analysis methods are Qualitative and Quantitative Methods. Both approaches have unique properties that are used for the search for knowledge.

6.3 Qualitative Data Analysis

6.3.1 Qualitative Enquiry

Qualitative Research Method the widely utilised for the quest for knowledge. The Qualitative Enquiry is the way for the search for knowledge that involves distinctions based on quality. As discussed earlier in CHAPTER-1, section 3.1 and CHAPTER-4, the Qualitative Enquiry is to investigate the quality of data instead of quantity. It is to capture the views, opinion and perception of the people and groups to inquire into the topic. Qualitative research helps to explain complex issues within natural settings of the research phenomenon. It provides the opportunity for in-depth study and often seen as an inductive approach. Qualitative Enquiry is used to find answers to 'Why' and 'How' of human behaviour, experience and opinions. This technique focused on the words and collected data through different methods, such as interviews and group discussions. Qualitative data can be used for all type of research and can be employed to a different kind of research strategies such as experimentation, investigation, Case Study, action research, grounded theory, ethnography, and archival research.

6.3.2 Forms of Qualitative Enquiry

There are five primary forms of Qualitative Enquiry. Those are Narrative Research, Phenomenological Research, Ethnography, Grounded Theory and Case study. However, different researchers/authors have provided various categories of Qualitative Enquiry, the among them the widely used forms are given in Figure 12 below.

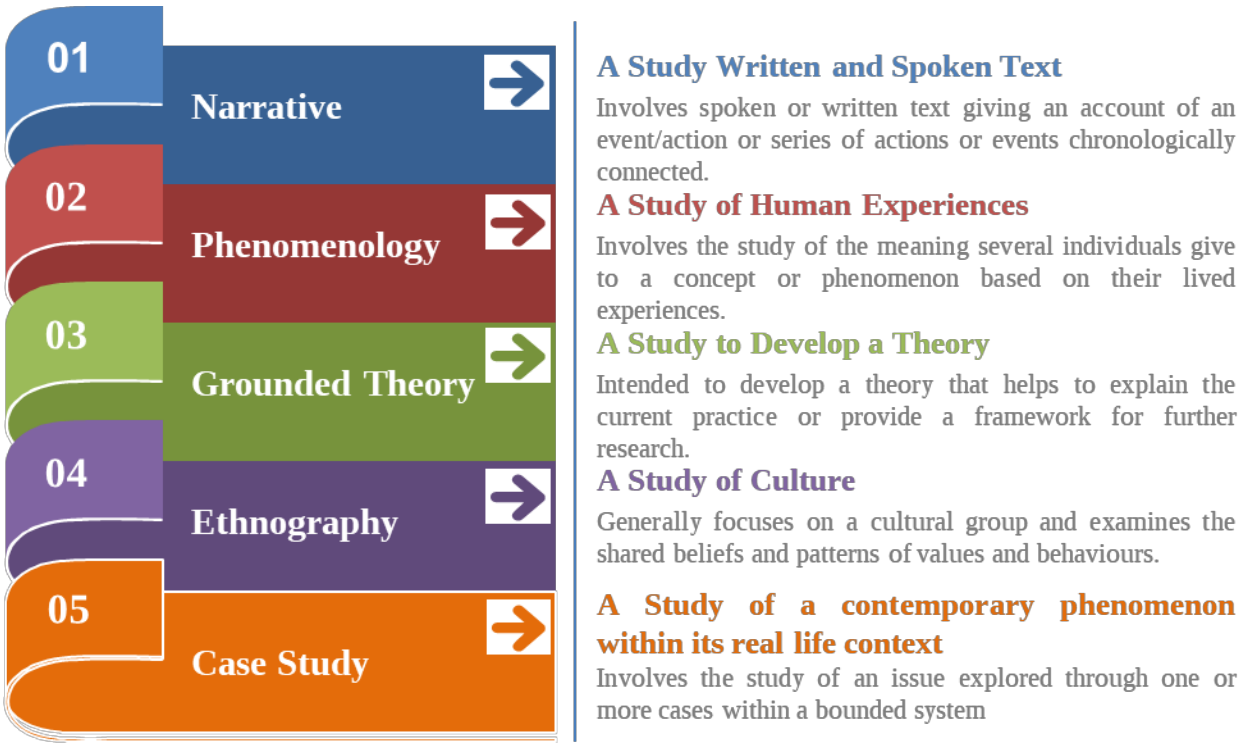


Figure 12: Widely Used Forms of Qualitative Enquiry

I. Narrative Research

The narrative is a message that tells the particulars of an act or occurrence or course of events. Narrative Research involves spoken or written text giving an account of an event/action or series of activities or events chronologically connected (Creswell, 2007). The narrative is using a test or oral presentation in writing or drama or cinema or as a radio or television program for a research purpose. Storytelling often characterises the narrative. The approach is mainly applicable when an individual is being studied where their stories are the unit-of-analysis. For instance- to write a biography, an author seeks life experience and stories about a person for further research. This approaches typically focus on the lives of individuals as told through their own stories.

Narrative methods are appropriate to investigate "real-life problems" in the "real world measures". It takes a linear approach to encompass the study of the experiences of an individual while covering their life stories and digging into their significance experiences.

Narrative Research seeks the validation of the audience. Audience validation is a useful part of a Narrative Research, but may not always support the conclusions of a report. Therefore, the accuracy of the story of a person is still questionable. Validation of the Narrative Research is possible by involving other individuals story those are closely related to the main character. However, Narrative Research is considered weak as it misses an objective view even though it is perceived in a sociocultural context. Therefore, it is difficult to access an accurate manner since it is subjective quantitatively.

Data in a Narrative Research can be in the form of field notes personal journal records, pictures, interview transcripts, observations (researcher's or other's) storytelling, written letters or autobiographical writing and audio or video recordings.

II. Phenomenological Research

Phenomenological Research is about observational predictions of a theory. Phenomenological was proposed by Edmund Husserl that grounds the study of human experience. This does not account the considerations of objective reality. Phenomenology Research involves the study of the phenomenon based on shared experiences of several individuals/participants. In phenomenology, a researcher describes the experience for all the individuals.

There are two basic types of Phenomenological Research, Hermeneutic Phenomenology and Empirical or Psychological Phenomenology. Hermeneutic Phenomenology Involves interpreting the lived experiences of the people in the study. It is a study of mythological texts such as Bible, wisdom literature and philosophical texts. This focus on the interpretations of the researcher. On the other side, Empirical or Psychological Phenomenology concentrates on the experiences of the individuals instead of the researcher's interpretation.

III. Grounded Theory Research

Grounded Theory is simply an investigation of new practices and generates theories from the data. It is a Research Method that helps to develop a theory which explains the main concern is resolved and processed. This method intends to form an opinion based on the experience of people that helps to explain the current practice or to provide a solid background for further research. This method needs a large number of participants to develop a generalised view of the topic. It suggests that theories are grounded in the data that can be built through actions, interactions and processes through interrelating categories of information. The two main types of Grounded Theories are Systematic Procedure and Constructivist Approach. The Systematic Procedure is a system that explains the process or interactions on a topic. Seeks to systematically develop a theory while explaining the process, action or interactions on a subject. It uses a systematic set of procedure to improve an inductively derived theory. The Constructivist Approach emphasises on diverse local worlds, multiple realities and the complexities of distinct worlds views and actions. However, both type of approaches aims to investigate the topic to develop a theory.

Grounded theory is a practical approach to build new theories. It brings out the high quality of the emergent theories and hypothesis that reflects an individual nature of the study and helps to generate a future investigation. In grounded theory, research can always refine and negotiate the findings and methods. Grounded theory approach demands systematic and detailed procedures for data collection, analysis and theory development. However, the grounded theory approach a high volume of data that could be time-consuming and need extreme care and effort. The data analysis needs analysis through multiple dimensions.

Having a variety of views in data that could mislead the focus of the investigation. For this approach, research may require pre-existing theoretical understanding and assumptions to start an inquiry.

IV. Ethnographic Research

Ethnographic Research focuses on groups such as teams, organisations and communities to examine the scientific description of peoples, their culture, habits, shared beliefs, mutual differences and patterns of values and behaviours. It is a form of Qualitative study that involves a large number of people who interact over time. Ethnographic Research uses observation of the participants and their day-to-day life. It is often a long term study to investigate the social arrangements and belief systems of communities, teams and organisations. Such type of study provides Holistic insights into people's views, beliefs and actions through detailed observations and interviews. Ethnographic Research emphasises on exploring the nature of a particular phenomenon instead of setting out and testing a theory.

The Realistic Ethnography and Critical Ethnography are two primary forms of Ethnographic Research. The Realist Ethnography reflects an actual account of the situation learned from the participants at a site typically written in the third person point of view (Creswell, 2007). The term 'realism' refers to the assumptions about the phenomenon that is investigated. It also relates to the style of writing that narrates the researcher's first-hand observation and experiences.

Critical Ethnography is a theory-based analytical approach and called a critical theory in practice. This method is to understand the cognition and behaviour of research subjects within historical, social and cultural frameworks. In this approach, a researcher position themselves linked to the participants. This type of investigation is adopted for the freeing the groups from marginalised in society. Critical ethnography entails a value-laden orientation empowering people by giving them more authority, challenging the status quo, and addressing problems of power and control (Creswell, 2007).

V. Case Study Research

A Case Study is a report about a situation, group, person or organisation that is not yet studied. A case can be an individual, organisation, action or event in a given time. However, in an abstract sense, a Case Study Research is to investigate a modern phenomenon that empirically enquiries a real-life context such as a claim, a proposition or an argument. It is an enquiry which uses multiple sources of evidence that aims to confine a real-life setting when the boundaries between a physical process and its context of use that is not evident. A Case Study involves the study of an issue explored through one or more cases within a limited system. A Case Study Research can employ a variety of data sources that fall into both the Qualitative and Quantitative.

The Case Study Research is widely being used by researchers to investigate into a unique situation: e.g. an individual, family or organisation. It usually employs interviews and observation techniques to collect data to serve a specific purpose.

A Case Study method is a relatively cost-effective method and is typically carried out by a single researcher to seek specific and new information about the real-life situation. However, Case Studies are often viewed as a challenging and soft method regarding handling complex information through observation.

There are three general classes of case studies, Linear, Process-Oriented and Grounded. Under those generalised classes, there are several other sub-categories such as illustrative case studies, Exploratory/Pilot Case Studies, Cumulative Case Studies and Critical Instance Case Studies. Adoption of those sub-categories depends upon the objectives of the study.

- **Illustrative Case Studies** are considered as primarily descriptive studies. These show the existing situation of just one or two events and serves as a prime point that presents an unfamiliar to give readers. In other words, Illustrative Case Studies introduces the reader to claim, proposition, idea or argument about a phenomenon or real-life context.
- **Exploratory (or pilot) Case Studies** are a type of a litmus test that is performed before implementing a verify the data for a large scale investigation. It helps to identify the appropriate measures and questions before a researcher start the primary inquiry.
- **Cumulative Case Studies** method combines the data collected from multiple units of analysis that is collected at different times. Using numerous cases allows higher generalisation while collecting past studies. Employing prior case studies is the cost and time-efficient method of employing new and repetitive studies.
- **Critical Instance Case Studies** is to examine single or multiple events to explore a situation of unique interest. This method is provided answers to cause and effect questions with a minimum interest in generalising or challenge a universal statement.

A critical, extreme or unique enquiry may use a single case for a study where the situation is and to introduce a modern phenomenon. Whereas multiple case studies are used to generalise the results or for theoretical replication, in the case of contrasting results. Critics often question the reliability or generality of findings of the Case Study method. That is because a Case Study of a small number of cases cannot offer solid grounds. However, cases study methods may give intense exposure to the study of a new phenomenon. Despite critics, the Case Study Research method is widely used. However, Case Study Research needs careful planning to address real-life situations, issues, and problems. The plan for a Case Study Research typically has five steps given in Figure 13 below.

VI. Steps in Case Study Research

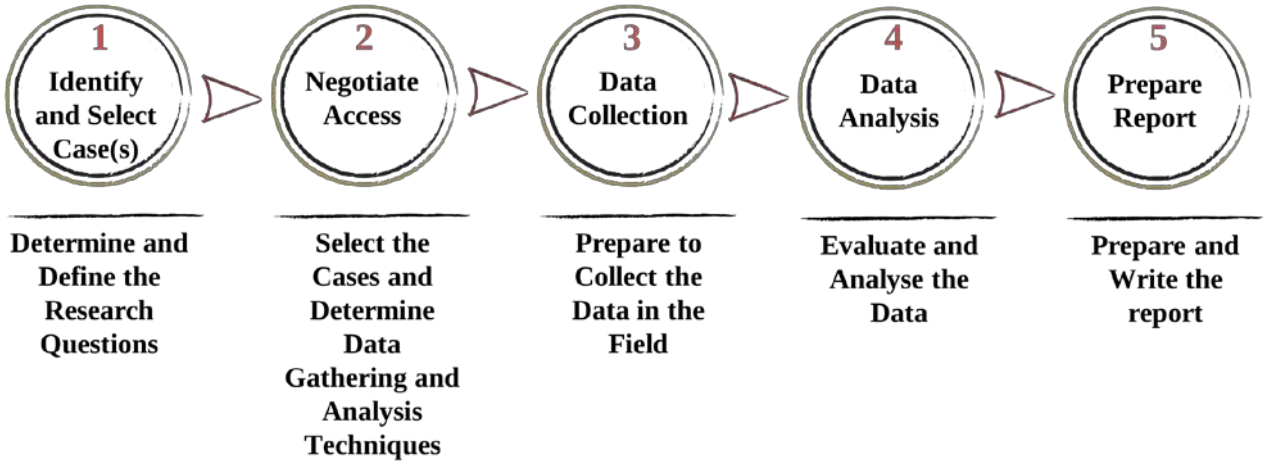


Figure 13: Steps in Case Study Research

- **Identify and select case (s)**

The first phase in a Case Study Research is to determine a substantial research focus by constituting questions and ascertain the purpose of the investigation that is studied. As discussed earlier, a Case Study is conducted in an organisation, a person, or a group of individuals. The participants of the Case Study are likely to be connected with, such as political, social, historical, and personal issues. Those participants provide a range of answers that add complexity to the investigation. Therefore, an in-depth study is required to produce evidence that leads to knowledge development through reliable solutions to the research questions.

Case Study Research asks questions with "how" or "why" that targets a limited number of events. A literature review assists in drafting the issues and determining the insightful questions about the problem. Carefully defined questions pinpoint the selection of cases to investigate the phenomenon and further to establish the methods of data collection and data analysis.

- Negotiate access

Once the cases are selected, access to those cases is negotiated. Negotiation is to determine the data collection and analysis techniques. The researcher needs a systematic approach to collect substantial evidence to ensure that the study is valid and reliable. Therefore, a researcher needs to negotiate to gain access to data, especially in the situation such as access to multiple case studies, access to organisations and access to communities. Gaining access involves convincing people for the research and finding the people

that provide detailed information about the study. Gaining access is a critical task that requires strategic planning.

Once access to an organisation or group is gained, it need renegotiate entry with people in the organisation such as agreeing on a deadline of data collection.

- Data collection

A Case Study Research uses multiple sources to gather a large amount of Qualitative data through observation, interview and documentation (discussed below). Handling an enormous amount of data need planning. The organisation of a large amount of Qualitative data needs a system to prevent the researcher from losing focus from the of the original questions or the research purpose. The data needs categorising, sorting and storing, and later retrieving for analysis purpose. Therefore, a pilot Case Study is suggested to explore the extent of data, its organisation and to identify the relevant measures.

A pilot study can bring clarity to data collection procedures in advance and helps to remove potential barriers in data collection and problems like data. A pilot study should involve each data collection (such as interview and observation) method and a variety of unit- of-analysis, to foresee the problematic areas that could include the events, key people, documentation such as information sheet, introduction letter, ethical principles. A researcher should look for opportunities to revisit and revise the data collection tools and techniques (discussed later) to attain rich data for the study.

- Data analysis

The Case Study Research uses field notes and other databases. The data is then categorised and referenced to ensure its availability for subsequent reinterpretation. Field notes are used to record feelings and personal impressions, emerging events, and emerging questions. However, data analysis is a critical task for a researcher that needs appropriate tools and techniques such as data reduction, coding and data display (discussed below). Some data analysis techniques include arranging information, creating categories, developing flow charts or other presentations, and tabulating frequency of events. Some researchers also collect and employ Quantitative data to support Qualitative data. Supporting Qualitative data with Quantitative data advances the understanding of relationships between the events. Some data analysis, such as thematic and pattern analysis may provide a variety of perspectives and insights to the study in multiple case study settings. Numerous cases increase confidence in the findings. However, if the results are conflicting the researchers should investigate deeply.

- Prepare Case Study Report.

The final step is to develop and write the case report. The Case Study report is a way to convey a complex problem in a manner that can be understood. A Case Study report should be allowing the reader to examine the study and to develop an independent understanding. Many Case Study reports are publicly accessible. Through a Case Study report, a reader can apply the experience in their real-life situation. A report should display adequate evidence to convince the reader about its validity, originality and reliability.
There are different techniques to write a report. Is research has multiple case studies, some reports use chronological order (case by case) while others are written as a blended story. A report should be critically examining looks for any incomplete sections. Some researchers employ representative audience groups to review and comment on the draft document. The comments from the audience group should be taken to makes revisions. The document reviewers audience could be the individuals that are the participants or unit-of-analysis of the study.

- Selecting Cases

Like experiments, a Case Study may be designed as single or multiple (Yin, 2014). The choice between single and multiple case studies depends on the problem being studied, the level of access granted and the time available to the researcher. Single case studies are employed to have an in-depth investigation of a phenomenon. Multiple case studies are intended to enable theoretical replication (as used in various experiments) to enable cross-case analysis and comparisons (Darke et al., 1998; Yin, 2013). As a general rule, the evidence from multiple case studies is often considered more compelling and the overall more robust.

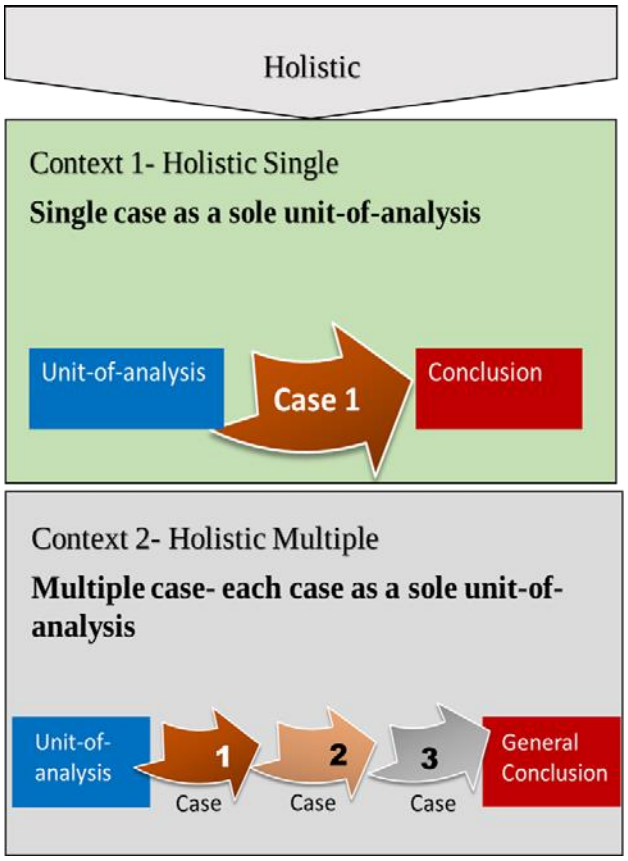


Figure 14: Example Holistic Case Study Approach

6.3.3 Unit-of-analysis

One misconception in the design of case studies is the ability to define what the unit- of analysis of the Case Study is (Yin, 2013). In Case of Study designs, the unit- of analysis represents the case being studied, and this can be either a single individual, an organisation or group, an event or even a phenomenon (Darke et al., 1998; Yin, 2013). Fellows and Liu (2009) suggest that this is explicitly defined

right from the onset of the research to ensure clarity in what constitutes the Case Study. There is the added choice of having embedded or Holistic units of analysis. A Case Study design is classified as a Holistic and Embedded approach. The Figure 14 above exhibits, the Holistic design is to emphasise the organic or functional relationship between parts and the whole of the case. Holistic design can have two contexts, single and multiple cases. Multiple Holistic cases are investigated to compare and generalise the conclusion. In Holistic design, a Case Study is treated as a unit- of analysis and is investigated as the whole.

The embedded approach can also have single or multiple cases. As given in the figure above, context 1, a single Case Study can have multiple unit-of- analysis that is embedded within the Case Study. In this example, a single Case Study has two unit-of-analysis (UoA 1 and UoA 2). In multiple cases (see context 2), a study can investigate more than one single cases, whereas each case can have multiple unit-of-analysis. This example shows, three case studies and each case have two unit-of-studies. In this approach, firstly a general conclusion is drawn based on each case that is used to establish the outcome (to enable cross-case analysis and comparisons) of all cases.

Figure 15 below represents a matrix of different context used in Holistic and Embedded Case Study approach. A multiple Case Study design offers many possibilities of critical analysis while comparing and contrasting the cross-case analysis. Whereas, a single Case Study is employed to investigate a new phenomenon. The choice of Holistic or embedded, single of multiple Case Study is based on the level of access a researcher can have in an organisation to investigate the case and the unit-of-analysis. For example, if the access to research is limited to one unit-of-analysis (such as the archive documents of one organisation) in that case, research should adopt a Holistic Single Case Study or Holistic Multiple Case Study. However, if the access level is negotiated for more than one unit-of-analysis (such as people and archive documents), that means research can compare the results of two different unit-of-analysis and should adopt embedded single case study. However, in the case of more than one Case Study, the researcher should take a multiple embedded Case Study approach.

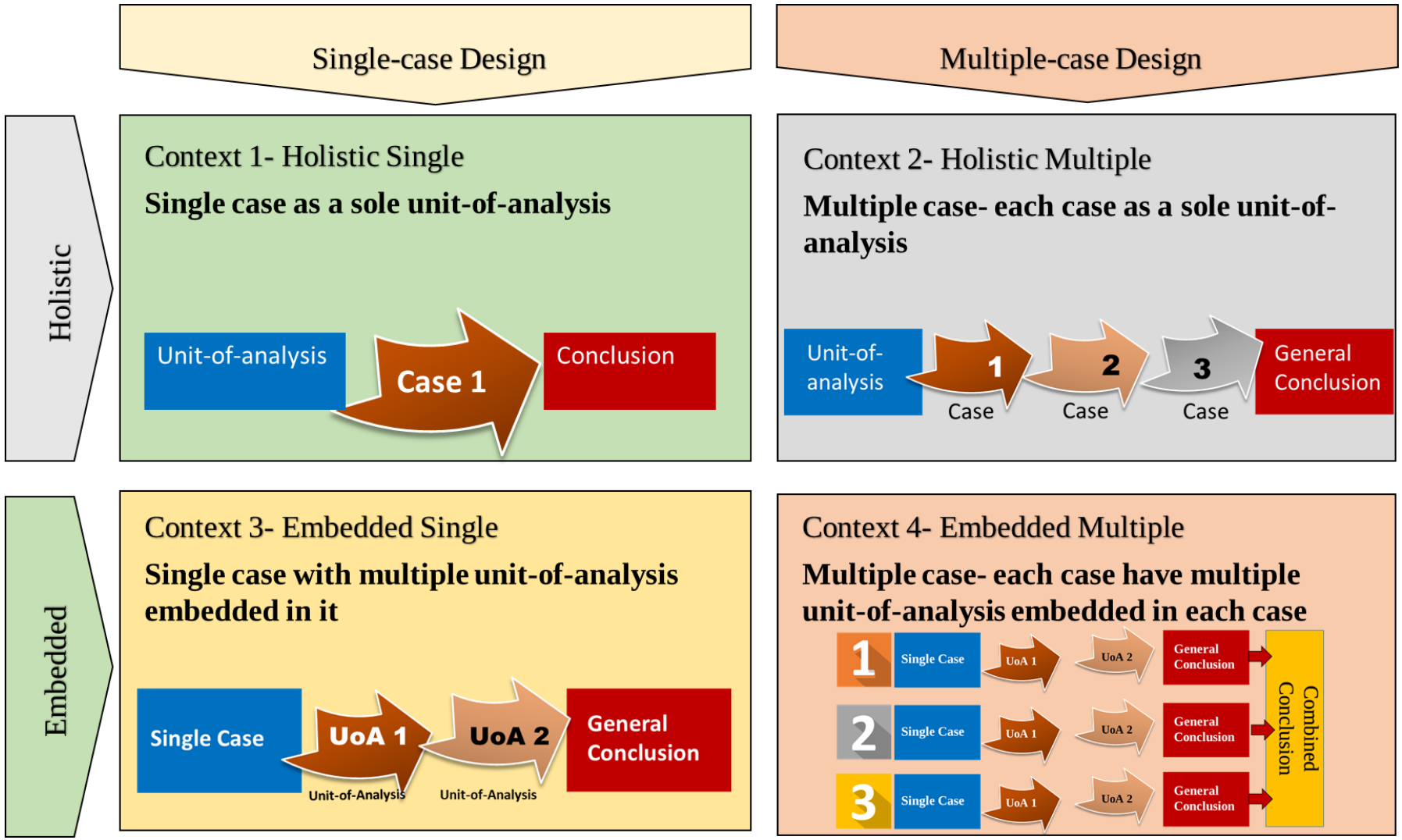


Figure 15: Holistic and Embedded Case Study Approach

6.3.4 Negotiating Access

Negotiating access to data collection is requires gaining trust and confidentiality of the person in authority. The person is often called a gatekeeper who can provide you with access to the organisation. In most cases, the gatekeeper is the higher authority in the organisation such as Director, CEO or senior managers.

Negotiating access needs documents to request urgent access to the organisation. The documents could be a formal request letter that should also provide brief research proposals and data collection plans, consent letter etc. The text must be convincing that offer an appealing reason for the study and the potential benefit of research outcomes. In simple words, why your research is necessary and how does the access to the organisation would impact on the study. A researcher should also provide assurances that anonymity of the case would be maintained throughout if access is granted, and the data collected would be used for research purposes only.

The cover letter should also indicate that ethical approval has been gained from the institution responsible for the research and demonstrate that the Case Study would be no cost to the organisation if access is granted. Most importantly, a researcher should give assurance that the researcher will maintain confidentiality and anonymity of participants. A copy of consent forms should be provided along with covering letter and information sheet.

6.4 Data Collection in Qualitative Research

As discussed in chapter 6, the Qualitative Enquiry is to investigate the quality of data that capture the views, opinion and perception of the people and groups. Qualitative research helps to explain complex issues within natural settings of the research phenomenon. It provides the opportunity for in-depth study and often seen as a deductive approach. A deductive approach should ensure the data collection and analysis process produces the best outcome. To ensure the best result, the data collection and analysis should go hand-in-hand for initial review. Wolcott, (1994); Miles and Huberman, (1994); Corbin and Straus, (2008) suggested that to identify new areas of the study where data collection needs to focus on three primary forms Watching, Asking and Examining given in Figure 16 below

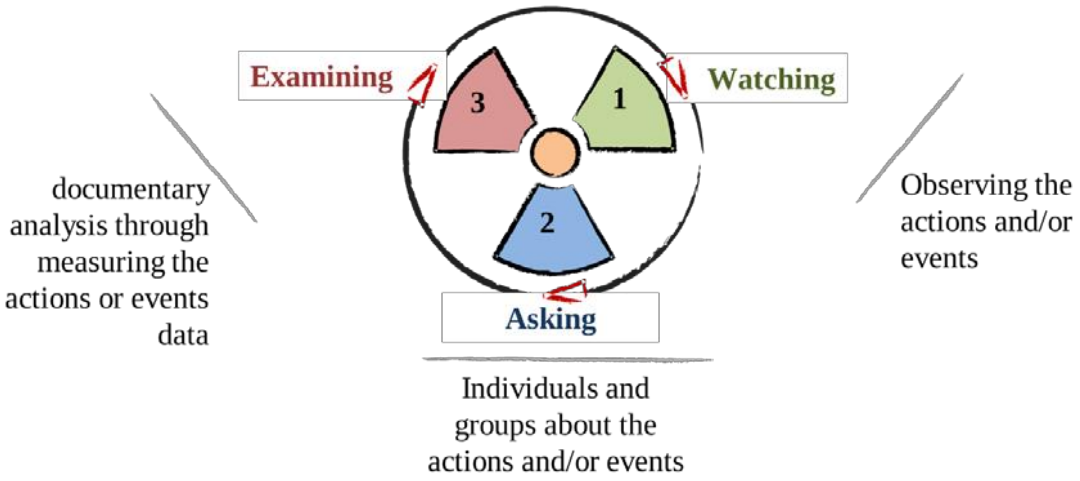


Figure 16: Three Main Forms of Data Collection in Qualitative Research

The three forms given in above Figure 5 represent a continuous process of observing the actions or events, asking individuals or groups about the activities or events and analyse to measure the activity or events until the desired quality of data collection is achieved. In this, 'Watching' is all about observation in which research takes a patient look to an action or event and record it for measurement. Afterwards, 'Asking' the interviewees and focused groups about the activity or event. Finally, 'Examining' is the documentary analysis through measuring the actions or events data collected during observation and interviews. Those three elements of a data collection are to ensure that the quality of data is appropriate for further data collection or need modification in research design or interview strategy.

6.5 Individual Interviews

Interviews are one of the best forms of collecting qualitatively rich data. Interviews provide the opportunity for a relatively informal conversation or discussion rather than in a formal question and answer session. There is a different type of interviews such as unstructured, semi-structured and structured given in Figure 17 below.

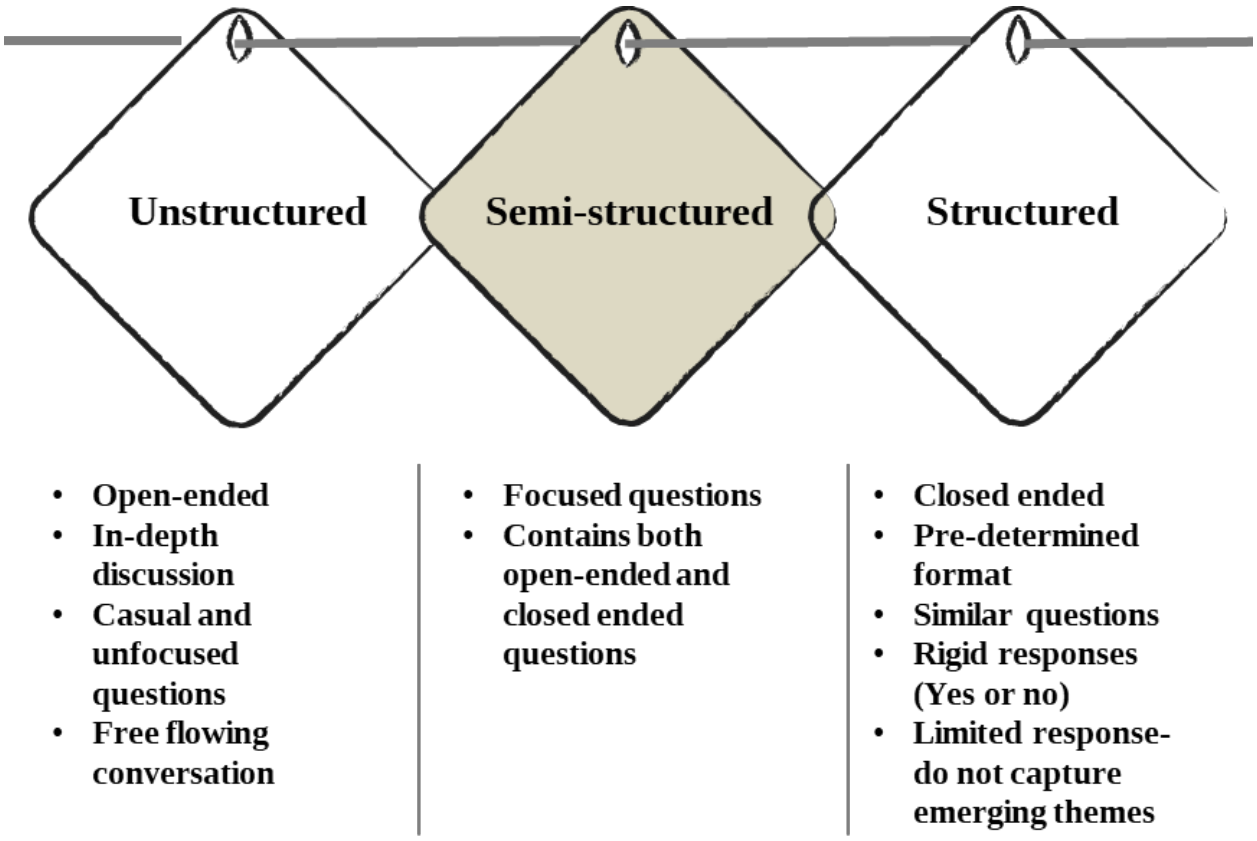


Figure 17: Types of Interview Questionnaires

As exhibited in Figure 17 above, the unstructured interviews have open-ended questions that are designed to encourage a complete and meaningful answer. Open-ended questions are unfocused and initiate an in-depth and free-flowing discussion. A few examples of open-ended questions are

- What is your research about?
- What is your data collection strategy?
- How will you recruit the interviewees for your research?

Structured Questions are focused on pre-determined questions. For example; Is your research a Qualitative or Quantitative or mixed? Through this question, you have given only three options to choose from. That will provide rigid responses such as Yes or No, that does not offer the opportunity for an in-depth conversation. However, data collected by Structured Questions can be presented in a matrix. Some example of Structured Questions is

- Is planning in a construction project important?
- Shall I start the interview?
- What is your research approach?

A combination that contains Unstructured and Structured interview question is called semi-structured. A semi-structured questionnaire for interview uses both types of questions to bring focus to the topic, action or event. For example, a researcher can start a conversation with a question such as

Question: Is your research Qualitative or Quantitative or mixed?

Answer: Qualitative

Follow up question: Why did you choose Qualitative study?

In this example, the original question is focused on finding the Research Method and the follow-up question is to initiate an in-depth discussion about the choice of Qualitative method.

The advantage of individual interviews is to get rich data from different people. The interviews can be conducted face-to-face, over the phone and the internet. However, face-to-face interviews provide the opportunity for observation of individual and reduce any misunderstandings of questions. In contrast, the questions can be rephrased and modified as suited to the situation. However, the interviews could be costly and time-consuming. For time-bound studies such as a dissertation, there is often the limited scope of large sample size that may raise the question of reliability and validity of data in case of only a few interviews.

6.5.1 Focus Groups Interviews

A study of the focused group is used when the investigation demands information from a group rather than individuals. The focused group should be small so that the data can be captured efficiently. However, small groups can limit the potential for the amount of information collected. Whereas, gigantic groups may make it difficult for all participants to participate and interact with the researcher and between each other. A focused group of 6 - 10 people are considered relevant to capture rich data.

The focused group study allows collecting rich data through a variety of opinions on the topic being investigated in addition to the brainstorming idea and a substantial debate. A dynamic group can help to generate some key themes related to the topic. The focused group is a relatively cost-effective option in comparison with individual interviews.

However, collecting rich data from a focused group is only viable through unstructured questions. In a focused group, the participants should have a common interest such as an

Association of Project Management is a community of practice in Project Management domain. The focus on the main topic may be lost if there is a conflict of interests and the discussion lead to an inappropriate converse that is not useful to the study.

6.5.2 Type of Questions

Data can be collected through a different kind of questions such as open questions, probing questions and closed questions.

I. Open Questions

Open questions allow the interviewee to provide an extensive answer that includes questions that start with what, how and why. 'Who' is mainly used to referring to the people. For example-

- Who is the best person to answer this question?
- Who has conducted the study?
- Who are your interviewees?

Questions with 'How' seeks a detailed description of something that is done or an action. It mainly used to understand or know the way an action is performed. For example-

- How do you satisfy your customers' needs and expectations?
- How do you design and monitor your training needs?
- How will you conduct the interviews?

The questions with 'Why' is used to find an explanation or a reason for something. For example,- Why have you chosen Qualitative against Quantitative? In this question, the interviewee is asked to explain the reason/s for choosing the Qualitative study and not choosing Quantitative research.

II. Closed Questions

Closed questions are to obtain specific information about something. It uses, What, How many How often, How far and How much. The answers to the closed questions are accurate, focused and short. 'How many' is commonly used to get the quantity of something. 'How much' is to get quantity or price. 'How often' refers to the frequency of an event. For example-

What is your name? What is your Age? These questions seek specific information about the respondent. The data collected from these questions can be presented through tables/matrix and further in graphical forms. For instance- 50 students were asked,

How many people responded to your survey? This question seeks a numeric answer that can be presented in a graphical form such as bar charts.

III. Probing Questions

Probing questions is to explore the responses from open and closed questions further. It uses phrases such as; That is interesting, could you please put more light on it and tell me more about it. Those type of questions are not pre-determined and originates during the interviews. Below are some examples of probing questions.

- Could you please tell me more about this?
- I am not quite sure I understood...Could you tell me about that some more?
- I am not sure what you mean by... Could you give me some examples?
- Could you tell me more about your thinking on that?

A good interview may consist of all types of questions. However, designing a questionnaire and conducting an interview needs a set of skills.

6.5.3 Observations

Observations take place in natural settings in which researcher research observes the people/participants in real-life situations. The real-life situations are the in-person interviews, not the internet-based or phone interviews. In observation, research takes descriptive notes, videotaping and pictures of an event or action to capture a detailed descriptive content.

Observing participants or a process or event is an excellent method in the area of business. In which a researcher/observer can also be a participant in the process. For example; observing a team of construction while being a part of the team and observe how team members spent their time to perform the action.

Observation is a cost-effective method for collecting rich data. That requires continuous observation to collect the first-hand experience and provides better interpretation to the researcher. However, observation could be time-consuming. The researcher can be distracted while being a participant in the process. The interpretations through observations could be biased as the experience of the researcher develops it.

6.6 Qualitative Data Analysis

Qualitative data analysis is the process of examining something to find out what it is and how it works. Qualitative methods of analysis are not well formulated. Therefore, a researcher should be evident in the approach to Qualitative data analysis that requires a good deal of explicit structure. A qualitative analysis should follow a formal system of reasoning that discuss the logical arguments of the choice of methods. The Qualitative analysis methods require a continuous approach to refine the interpretations through data collection and analysis procedure. The procedure contains, collecting some data, analyse data, collect more data and refine the interpretation. In this method, data should be collected and interpreted in batches — for example, the study required at least 50 interviews. The data collection should be done in small batches, such as five interviews and analysed for the validity and reliability of data and interpretations. Dividing the data analysis into batches allows avoiding any mistakes as they appear. Each batch of data analysis aims to modify the questions, data collection strategy and data analysis strategy; based on the richness of information and interpretations. There are four steps of data analysis, reduction, coding, display and conclusion. Figure 18 below display an example of the Qualitative data analysis process.

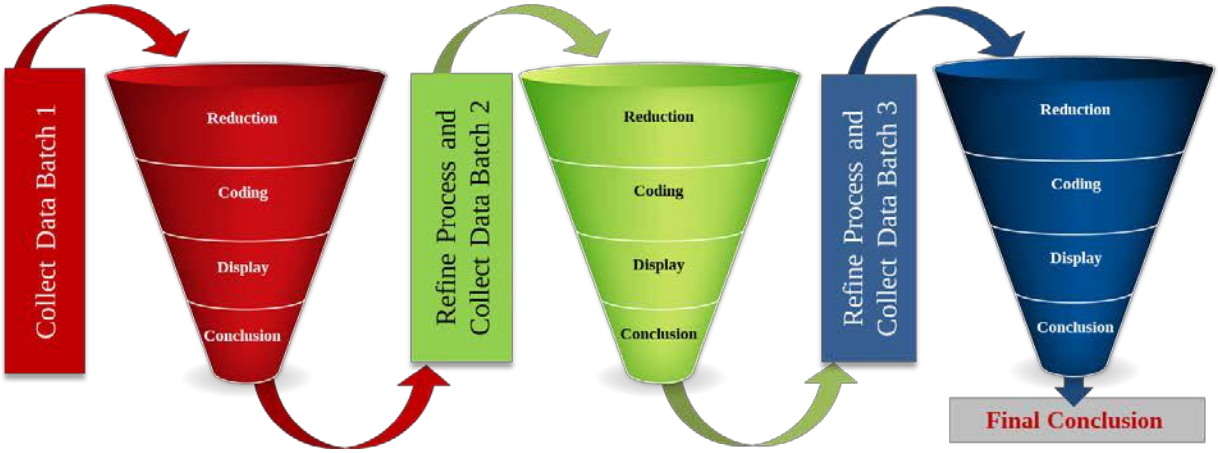


Figure 18: Qualitative Data Analysis Process

In this example, data is collected in three batches; the first batch of data is reduced, coded, displayed and concluded. While Learning through experience, the data collection strategy should be refined. This process should be continued until the conclusion is drawn.

6.6.1 Data Reduction

The first step in the analytical process involves the abstraction of textual data through sorting, focusing, discarding and organising large segments of data into manageable forms. Data reduction is essential to avoid data overload due to the massive amounts of data. In data reduction, choices are made on exactly what data is essential for the study and to mark the vital data. The decisions

of data reduction or the critical data are guided by the study questions, issues or topic. The data reduction process requires, reading data, mark data (that is relevant to your questions) and code the data; showed in Figure 19 below. Coding is a common aspect of data reduction.

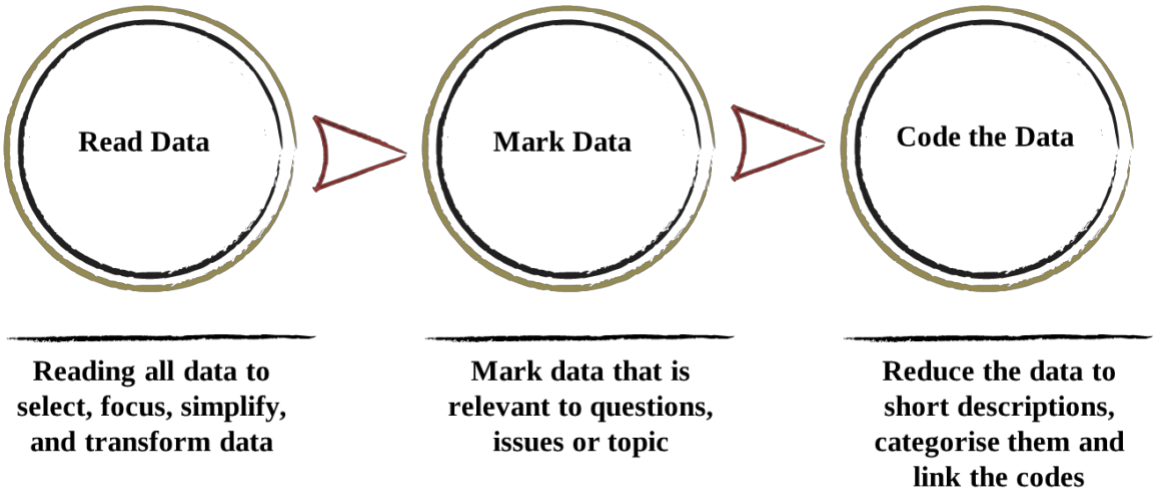


Figure 19: Data Reduction Process

6.6.2 Coding

Generally, data coding is considered as a sub-process of data reduction. It had become a basis for developing Qualitative data. Coding can be done in some ways such as assigning abbreviation, number, colour or symbol applied to a segment of words, sentence or paragraph of transcribed field notes, to classify the words. It can also be done by colour coding different categories or by cutting text segments and placing them on notes card. Coding is the primary process of developing and sorting concepts from the data and assign meaning to a piece of information. It is a way to integrate major themes while labelling, compiling and organising the data. Codes are retrieval and holding devices that allow the researcher to spot summarise and synthesise, what is happening in the data. It helps to pull out and cluster all the segments relating to the particular hypothesis, concept or theme.

There are two types of coding, initial coding and focused coding. Initial coding is the starting point of generating numerous codes while reading the data. Focused coding is the review of initial codes and eliminates the less useful codes. Focused coding concentrates essential issues, topics or questions.

6.6.3 Data Display

Displaying the data through narrative text alone is a weak form of display. The Qualitative data display needs techniques such as matrices, charts, figure and checklists that exhibit essential features in the data. Data display techniques help to represent information systematically. Such techniques also help to present a strong case and demonstrate a higher chance of drawing and verifying valid conclusions. Data

display is an organised way of compressing information and assembling in a way to conclude. Display techniques are used to show systematic patterns and interrelationships in the data. It is to reveal any new connections and themes in the data that was not noticed earlier in the study or other studies. Data display is also used to demonstrate inter-case or cross-case analysis such as similarities or comparisons and draw conclusions.

6.6.4 Drawing Conclusions and Verification

Conclusion drawing and verification is the final stage of the data analysis process. The process involves identifying (noting) patterns and causal flows in the data, seeking explanations and drawing the necessary conclusions. The conclusion of data analysis relies heavily on logical evaluation and systematic description. The conclusion is a combination of descriptive analysis and causal analysis of the data. Using just one form of study would be a weak form of concluding that it is hard to verify the facts.

Descriptive analysis is to represent the data, its meaning and observations to the reader. Descriptive analysis is used to describe what the researcher has seen in the data. In the casual study, the research tries to logically link the different concepts in the data to explain the given rationale behind the meanings of the phenomenon of the data. Both ways are used to represent what the researcher sees in the data. However, jointly both type of analysis allows establishing a relation, association, a mechanism or a context between the codes.

While drawing conclusion and verification, a researcher must refer back to data display, and raw data (through cross-references) as descriptions or casual settlements are made. This is the stage where the effort of researcher for data collection and data analysis stages pays off. A systematic, organised and efficient coding and data collection leads to efficient and accurate access to the data and finally the conclusion. However, a conclusion with an accurate description and causal statements demands an extended effort of the researcher.

A researcher must be attentive to patterns and themes that are originating from the data. A researcher should have an understanding of contrasting and comparing the themes and patterns. A researcher should also look for disconfirming information or contrary evidence to refine the data collection and analysis strategy at the next stages to confirmations. A researcher also needs skills for identifying clustering, systematic relationships, causality and any intervening variables.

6.7 Qualitative Analysis Techniques

As discussed above, the qualitative research outputs in the form of words. For example, data from journals and other media that is in written texts, or through in-depth interviews. The data analysis could have a different system. Several qualitative data analysis techniques are suggested by scholars who may be used for different types of data analysis.

Figure 20 below presents techniques of qualitative data analysis.

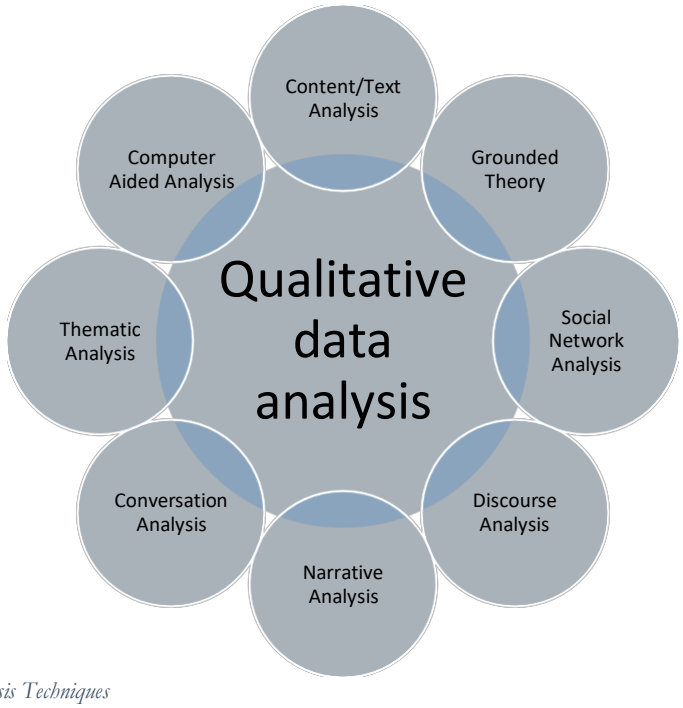


Figure 20: Qualitative Data Analysis Techniques

6.8 Content/Text Analysis

The content analysis starts with some ideas about hypotheses or themes that might emerge during the investigation. Content analysis is also called text analysis. It looks for emerging themes in the data. A researcher can use a colour-coding or numbering system to identify text about the different themes. In this analysis, a researcher group the emerging ideas and collect evidence about different views on a topic.

See YouTube video for Content analysis https://www.youtube.com/watch?time_continue=408&v=SgY0MNdKVwM

6.8.1 Grounded Analysis

Grounded theory is similar to content analysis. A same coding technique is used for grounded theory. However, likewise, content analysis, the grounded theory analysis, does not have a defined hypothesis or a starting point. Instead, a researcher allows the data to bring emerging theme from the discussions. In practice, a researcher put aside their views and focus on what data says. A literature review is a form of a grounded theory analysis in which research tries to gain knowledge about a topic and critically analyse the different unit of analysis to explore the different school of thoughts.

6.8.2 Social Network Analysis

Social Network Analysis in the form of analysis that focuses on examining the links between different views of individuals. Afterwards, a researcher tries to understand the motivational factors and behaviour of individuals that originated their views.

For example, to understand why some project managers are more successful at work than construction managers. The social network analysis is more successful while combining with other methods such as content analysis or grounded theory. For example, the content or grounded study can help to identify common themes about relationships between success factors and project managers. It uses a data visualisation approach to show the relationship between the success factors and the project managers. Similarly, content analysis or grounded theory analysis can be conducted to identify the relationship between the critical factors and success of construction managers. Afterwards, a network diagram can be used to show the relationships between critical factors and project managers and construction managers.

6.8.3 Conversation Analysis

Conversation analysis is generally used for ethnographic research. In conversation analysis, a researcher assumes that the conversations have some rules and patterns. It also assumes that conversation can only be understood by analysing the past and future. Conversation analysis needs an elaborated examination of the situation. The examination includes the exact words and the order that is used in a conversation. It also analyses the speech changes and where the emphasis is placed. Radio interviews, YouTube interviews and News Interviews are some excellent examples of the conversation analysis. The conversation analysis can also be used to analyse the difference between the statements of the same person in different conversations. It is considered as a detailed analysis.

6.8.4 Discourse Analysis

Discourse analysis is an approach to analyse the conversation and the social context in which the conversation occurs in many of the humanities and social sciences **studies**. This is a detailed analysis that includes previous conversations, social relationships and the concept of individual identity. Discourse analysis may consist of written sources, such as emails or letters in which a researcher pays close and systematic attention to particular texts and their contexts. For discourse analysis, some scholars also consider the body language as a rich source of data surrounding the actual words used. It is widely used for ethnography, conversation and narrative analysis studies by anthropologists, communications scholars, linguists, critics, and sociologists.

Useful Link: http://www.discourses.org/journals/das/whatisdiscourseanalysis/index.html

6.8.5 Narrative Analysis

Narrative inquiry captures personal experience over time. It accounts for the relationship between individual experience and cultural context. It is meant to gather, analyse, and represent people's stories systematically. Narrative inquiry is used to capture the traditional and modernist views, reality and personhood.

Narrative analysis is used to analyse text such as autobiography or any story related to **an organisation or society**. Narrative inquiry focus **to understand how people think**. The narrative inquiry can be conducted on a variety of text from journals field notes, letters, interviews and family stories to understand the way people think and how they form an organisation**.** This approach typically focuses on the stories about their lives is individuals. Therefore, it usually involves real-life research while collecting data through semi-structured interviews.

6.8.6 Thematic Analysis

The thematic analysis emphasises the content of a text. It focusses on capturing "what" is said. In this analysis, a researcher organises the content by looking for emerging themes or topics. Relevant words or concepts are discovered to identify emerging themes and topics. The simple text search and word frequency queries are used for finding themes or concepts. It also uses visualisation tools to discover deeper meanings from the test.

The thematic analysis should not be considered as a methodology. It is a tool to find common themes in content. Thematic analysis can be conducted on a variety of text sources such as interview transcripts,

documents, journals, open-ended survey responses or other articles. The thematic analysis could be conducted on the social media posts, web content and images and videos.

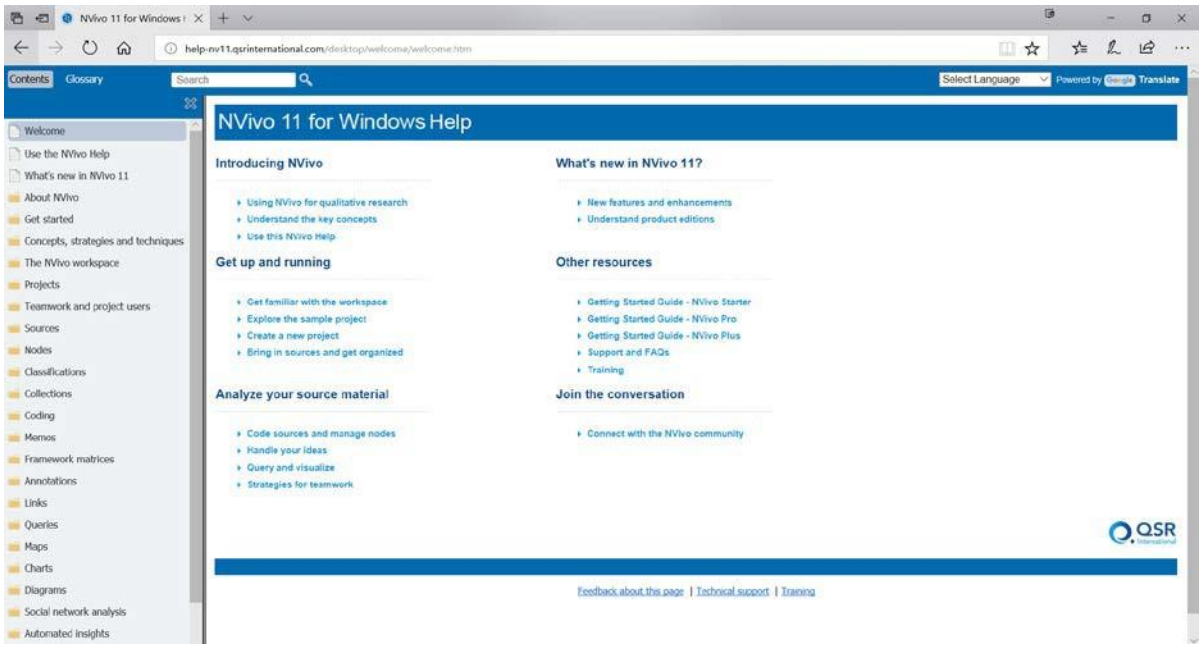
The thematic analysis helps to find connections between the content and emerging themes to help inform decisions. It helps to raise queries to ask complex questions and identifying the new meaning from the data. In short, thematic analysis is used to find emerging themes and discover concepts using word frequency queries and text search.

See Thematic analysis on NVivo

http://www.qsrinternational.com/nvivo/nvivo-community/blog/thematic-analysis-interview-data-nvivo

6.9 Computer-Aided Quantitative Analysis

Many computer applications are available to assist with qualitative data analysis. NVivo and Atlas.ti are the leading applications to analyse large quantities of data. NVivo os widely recommended application that helps to reduce the pressure on a researcher to read and code everything manually. A complete help guide to using NVivo is available through the link below.



http://help-nv11.qsrinternational.com/desktop/welcome/welcome.htm

See YouTube channel for Qualitative analysis through NVivo

https://www.youtube.com/channel/UCnfY7xiVmjJ-y0Y3cFN0MJw

See Atlas.ti YouTube Channel https://www.youtube.com/user/ATLASti01

6.10 Activities

Complete the below sentences.

1. Storytelling is the form of_____research.
2. Phenomenological Research is about_____predictions of a theory.
3. is a practical approach to building new theories.
4. Narrative methods are appropriate to investigate _____.
5. _____ is to examine the scientific description of peoples, their culture, habits, shared beliefs, mutual differences and patterns of values and behaviours.

What are the three general classes of case studies? Select the three appropriate answer from the list below.

- ☐ Linear
- ☐ Process-Oriented
- ☐ Illustrative case studies
- ☐ Exploratory/Pilot Case Studies
- ☐ Cumulative Case Studies
- ☐ Critical Instance Case Studies
- ☐ Grounded

Below are the five steps of a case study research. Organise them in the right order.

- ☐ Identify and Select Cases
- ☐ Data Analysis
- ☐ Prepare Report
- ☐ Negotiate Access
- ☐ Data Collection

Which Case Study design is treated as a unit-of-analysis and is investigated as the whole? Choose an appropriate answer.

- ☐ Holistic Single
- ☐ Holistic Multiple
- ☐ Embedded Single
- ☐ Embedded Multiple

Which documents are required for negotiating instant access to the organisation? Select one or more appropriate answers from the below-listed items.

- ☐ A formal request letter
- ☐ A brief research proposal
- ☐ A data collection plan
- ☐ A consent letter
- ☐ An ethical approval
- ☐ All Above

What are the three Main Forms of Data Collection in Qualitative Research? Select one or more appropriate answers from the below-listed items.

- ☐ Watching
- ☐ Hearing
- ☐ Examining
- ☐ Negotiating
- ☐ Asking
- ☐ Collecting

Is the below statements True or False?

Unstructured interview questions are predetermined and are closed-ended.

○ True ○ False

The semi-structured interview can have both the open-ended and closed-ended questions.

○ True ○ False

Structured questions provide the opportunity for free-flowing conversation.

○ True ○ False

Unstructured questions do not help to capture emerging themes.

○ True ○ False

Could you give me an example? Is a Probing Question.

○ True ○ False

CHAPTER 7

QUANTITATIVE DATA ANALYSIS AND EVALUATION TECHNIQUES

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7.1 Preface

As introduced in earlier chapters, quantitative is expressible as quantity in a numeric form that is measurable. The quantitative measurement is a process. The measurement process requires assigning numbers to the general point of views of respondents. The quantitative approach is likely to be associated with the deductive approach to test theories. The questionnaire survey is one of the widely used methods to collect quantitative data. It is a reliable approach to gathering reliable data for generalisation and hypothesis testing from a large sample size.

This article is to introduce the design and implementation of Quantitative Research Methods. This article aims to make you aware of the understand the logic and basic principles of Quantitative research methods. Through this article, you will learn to

- evaluate the opportunities and constraints in Quantitative Research Methods
- differentiate different types of variables and their Quantitative relationships, and
- describe the process of developing Quantitative research hypotheses.

7.2 Quantitative Research

Quantitative research is a means of testing objective theories or prior formulations by examining the relationships among variables. Quantitative Method aims to quantify perceptions, experiences, attitudes or behaviours, measure variables on which they hinge, compare, and point-out correlations. Quantitative Method is often conducted via a survey on a representative sampling so that the results can be extrapolated to the entire population studied. Quantitative Method requires the development of standardised and codifiable measurement instruments through structured questionnaires. The structured questions are used to gather numerical data that provide the opportunity of objective measurements to address the questions relating to what, how much, and how many. Quantitative analysis is a deductive process that is rooted in the positivist philosophical paradigm (see Chapter 4).

7.2.1 Quantitative Philosophical Foundations

As discussed in Chapter 4, the philosophical foundations of Quantitative Research are rooted in its ontological, epistemological and axiological assumptions. In philosophical foundations, Quantitative research is leaning towards the positivist paradigm. The Ontological position of Quantitative Research presents, the reality is objective and singular, apart from the researcher and the reality is a concrete structure. Moreover, the Epistemological position of quantitative research is positivist whereas; Quantitative Research represents that the researcher is independent of that being researched and the Axiological position of the research is value-free and unbiased.

7.2.2 Logical Research Approach

Based on the philosophical foundations, the Logical approach of Quantitative Research gives the process of reasoning. Since the positivist approach is considered as a Deductive Approach that starts with general knowledge and predicts a specific observation. The deductive approach is used to test the theory and hypothesis through observation and confirmation. Testing hypotheses need measuring things as accurately as possible. A measure should be valid and reliable.

Validity is the truth about the measures taken for testing a hypothesis. If a wrong measure is taken to test a hypothesis, it is not valid. A measure is valid if it works accurately to serve the purpose of measuring. For example, if a measure is set to assess intelligence quotient (IQ), but an IQ questionnaire that measures aggressiveness is not valid; however, an IQ questionnaire that does seem to equate with how intelligent people are as valid.

On the other side, Reliability is the ability of the measure to produce the same results under the same conditions. For example, A Quantitative Research that is conducted at two different places adopting the same measures. If the results match, then the measures are reliable. The easiest way to assess reliability is to test the same subjects twice. The questionnaire must be valid as a reliable questionnaire will produce similar scores at both points in time.

Reliability is also considered as the consistency of the data. Consistency in data/reactions of participants is often calculated through Cronbach alpha (α). Cronbach Alpha is a measure of internal consistency of the data. In simple terms, if the data is collected at different intervals (at different times) does that data gives similar results while using the same measure. If yes, the data is reliable and consistent otherwise not.

As discussed above, Quantitative Research has positivist philosophical foundations in which the world is external and objective, and the research is value-free. The Positivist paradigm assumes that reality is a concrete structure that is closely connected to the Deductive approach that focuses on the facts and looks for causality. The deductive approach follows a robust process for testing a theory or hypothesis that requires valid and reliable measures.

7.2.3 Quantitative Research Design

The research design is how the chosen method is planned and organised for a particular study. A quantitative research design is the standard experimental method to collect quantitative data for hypothesis testing. A quantitative research design is all about the planning of data collection and experiments. It is a well thought and justified procedure that helps a researcher to test the hypothesis by reaching valid conclusions (See section 6 in CHAPTER-4).

A quantitative research design should incorporate the essential requirements for data collection and analysis. The following is a list of questions that need to be answered in research design.

- What are the unit-of-analysis?
- What type of data required for the experiment?
- What equipment is required and how it is organised?
- Who are the subjects/experimental groups?
- What is the sampling strategy?
- How will the data be collected?
- What are the methods of data analysis?

Answering those questions should inform discussions that follow on research methods such as Experiments, Quasi-experiments and Surveys. Figure 21 below exhibits the primary considerations for a quantitative research design.

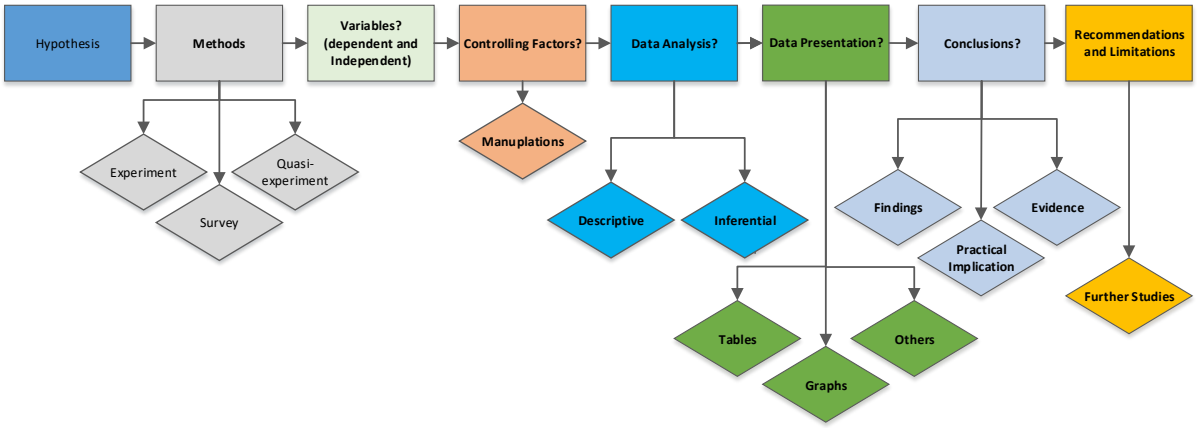

Figure 21: Quantitative Research Design

Choices given in this figure must be justified with appropriate evidence. For example, research chooses Experiments methods, among others; the decision must be justified in briefly discussed, why have you chosen Experiment method and why other arrangements are not appropriate for your research. While considering quantitative research design, research should ask questions and incorporate into the discussion; such as.

- What is your Hypothesis?
- What are the Variables – Dependent, Independent?
- How will you control for extraneous factors?
- What type of Manipulation can be made?
- What will be the Observation and Measurement?
- How would you analyse the data? (descriptive or inferential statistics)
- How would you plot/present the results? (tables, graphs, others)
- Are there different ways of presenting the data?
- How would you conclude?
- Is there evidence to support your hypothesis?
- If so (or if not), what does it imply practically?
- Any surprising findings or anomalies?
- Do these need further study?

7.2.4 Experiments

The quantitative experiments are referred to an exact science that statistically helps to develop the understanding of social realities of the people's perception of a topic. It is an effective means of strengthening the internal and external validity of the data. It uses traditional mathematical analysis. The Quantitative experiments use standard formats of generating the hypothesis to be proved or disproved. However, a hypothesis must be provable by statistical means. The quantitative experiments are useful for testing the results that are gained by a series of lab or field experiments that leads to a final answer.
The setting of the experiment is a significant distinction between **laboratory** and **field experiments**. The **laboratory experiments** are conducted in an artificial environment. Artificial settings give an advantage in controlling the confound variables precisely. The artificial situations are that it does not occur in everyday life, such as an earthquake or other natural calamities. Artificial settings can be

replicated if a similar investigation is wished again. However, the types of variables and situations researched under artificial settings are restricted, and findings cannot be generalised for real life.

On the other side, **field experiments** have good ecological validity that can be easily transferred or related to real-life situations because they take place in familiar environments. However, in a field experiment, confounding variables cannot be controlled easily as each real-life situation can have rential different variables.

A quantitative experiment can be a challenging and expensive task that requires much time to perform. Therefore, a quantitative experiment must be carefully planned. Quantitative experiments usually demand extensive statistical data. Gathering extensive data could be time-consuming and stressful, especially in industries such as construction. Also, hypothesis testing through the qualitative experiments requires much effort for retesting and refinement of the data and research design. This is time-consuming and requires a commitment of time and other resources to fine-tune the results.

The qualitative experiment is conducted to prove or disprove the hypothesis, which simply provides answers such as yes or no. In this, there is very little room for any uncertainty or grey areas.

I. Experimental Research Design

As discussed above, the research design is a procedure that helps the researcher to conduct the data collection and analysis to reach the conclusions. In experimental research design, research has a predetermined hypothesis. In research design, a researcher must explain the hypotheses and the process of reaching the hypothesis. It also requires discussion of the variables and the control factors followed by the type of data manipulations (if any) and finally, the observation and measurements for data analysis. Figure 22 below exhibit the list of a few questions that should be used to discuss the experimental research design.

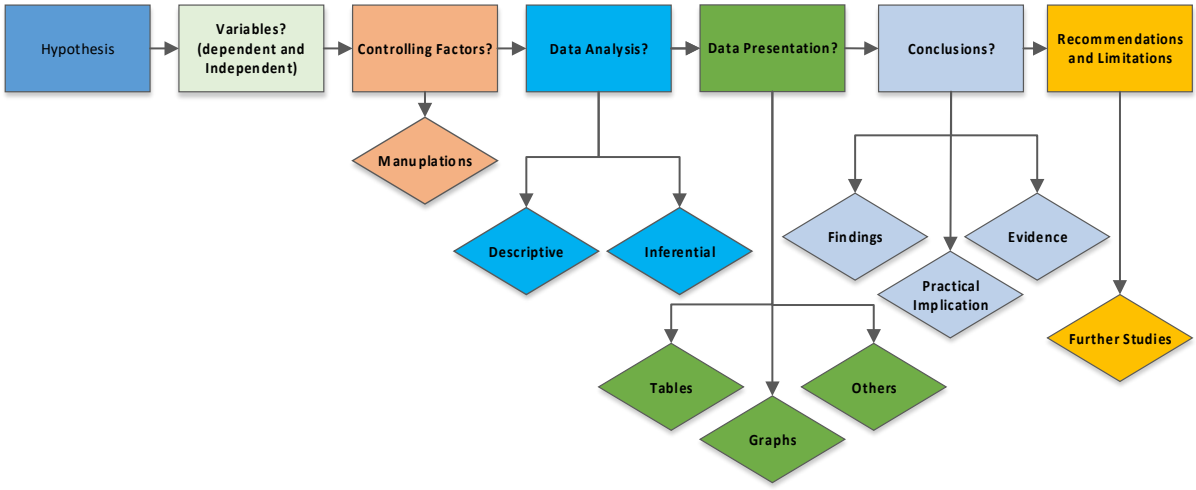

Figure 22: Experimental Research Design

Useful Links http://youtu.be/aKIBXXNIiJo and http://youtu.be/geiKyEvR6Yg

II. Quasi-experiments

A quasi-experiment is similar to a traditional experiment except for the random assignment. Random assignment is a technique to assigning research participants to different groups. Quasi-experiment is used to study the causal impact of an intervention on its target population. In quasi-experiment, the research does not have complete control of independent variables because the intervention is already in place that's makes it difficult to manipulate the variables. For example, research is conducted to "measuring the effects of smoking and not smoking". In this research, there are two control groups, 1) the people who smoke and 2) the people who do not smoke. In this research, the researcher will rely on the existing population, whereas the control groups are included, but the individuals cannot be randomly allocated to the smoking or non-smoking conditions.

III. Designing Quasi-experiments

Many phenomena occur in the context of natural environments (e.g. impact of speed limits on accident occurrence). The study of such phenomena requires that experimentation take account of such contexts where the (random) assignment of subjects to control and experimental groups is not ethically or practically feasible. Quasi-experiment is particularly suited to studies evaluating the impact of various social policy interventions or reforms.

A practical example is an investigation of the effects of a police crackdown on speeding (independent variable/experimental treatment) on road fatality rates (dependent variable). In this example, the effect of extraneous variables is ruled out by identifying similar areas/regions/countries where no such police crackdowns (i.e. no experimental treatment) occurred and measuring the road fatality rates there.

Other examples

- effect of teaching styles on student attainment
- construction site operatives' attitudes towards health and safety on-site change after being presented with a toolbox talk
- effect of the colour of lecture theatres on students' moods/concentration levels

7.3 Surveys

The survey method is used to explain trends or features of a large group. It is also used to plan a much focused and in-depth study. Quantitative surveys are an efficient method to collect a large amount of data in a short period. It is a cost-effective method that has the potential to generalise the results. The surveys can be used for all kind of research that tends to cover the respondents from different groups and professions. It is a cost-effective, generalisable, reliable and versatile method for quantitative research.

In a quantitative survey, a researcher poses some set of predetermined questions to an entire group of individuals. It is a useful approach to describe or explain the features of a large group or groups. It is used to quickly gaining some quantitative data about a topic to help prepare for a more focused, in-depth study for hypothesis testing. It is a time-intensive method that uses closed-ended questions. However, despite having many qualities, the survey method can have issues such as lack of flexibility to gather rich data and its validity as being a single method for data collection. A quantitative survey that has closed-ended questions is inflexible to capture in-depth views of respondents.

7.3.1 Survey Research Design

A quantitative or numeric description of trends, attitudes or opinions of a population by studying a sample of that population. It is a generalisation about the population through the application of appropriate statistical techniques. Analytic, Descriptive and Exploratory Surveys are the different forms of surveys. Analytic, Descriptive surveys are the form of quantitative research. Whereas, the Exploratory survey has qualitative characteristics and not considered for quantitative research.

Analytic surveys enable a researcher to assess to causal relationships between social (or other) phenomena. It emphasises a deductive orientation for generalizability. In an analytical survey, the sampling, data collection procedures and analysis are thus issues of significant concern. The intention is to test a theory or evaluate the strength of a cause and effect relationship (e.g. the impact of operatives' trade on risk tolerance on construction sites).

The descriptive survey focuses on producing a description (or profile) of the population at a specific point in time or varying points in time for comparison purposes. It intends to assess the attributes of a population (e.g. nature, the frequency of occurrence and severity of disputes on construction projects, or parties' preferences of dispute resolution methods).

7.3.2 Planning Survey Research

Likewise, other research, survey research also need planning. Figure 23 below exhibits the steps of survey research.

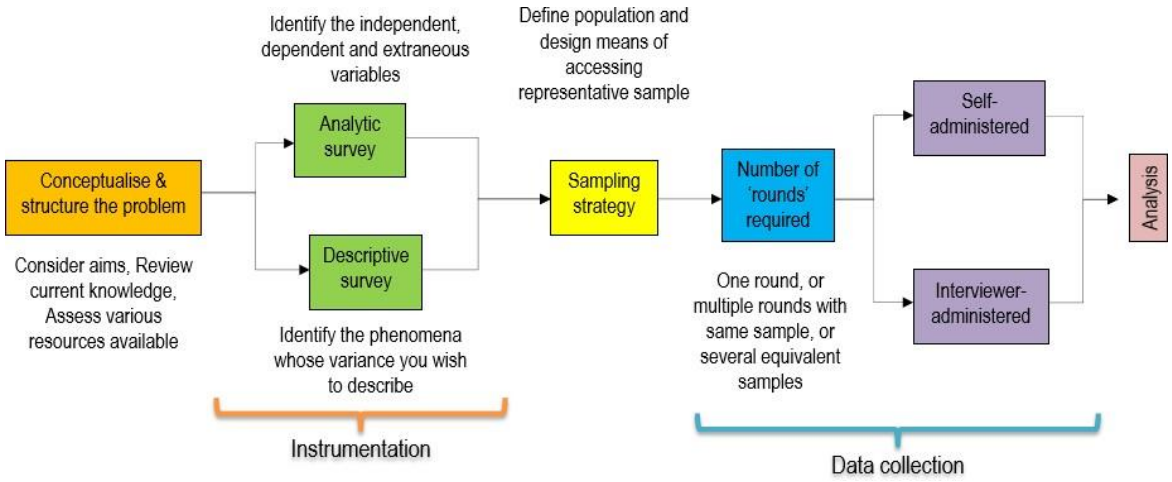

Figure 23: Steps of Survey Research

I. Conceptualise and Structure of the Problem

In this, research reviews current knowledge and access various resources to develop a priori theory and establish the relationship between variables and structure a problem. To do that, a literature review is conducted with a focus to expose or elaborate on the relationships that exist between variables of interest. It is to assemble of all the relevant variables (dependent and independent variables), and elaborate relationships existing between them based on a priori theory. It should include any potentially extraneous variables whose influence must be controlled. The control of extraneous variables in analytic surveys is achieved through the application of statistical techniques to data analysis. A robust conceptualisation is thus vital to the design of valid surveys.

II. Instrumentation

Instrumentation step is to consider the choice of data collection instrument such as an Analytic or Descriptive survey. Whereas, Analytic survey demands identification of independent, dependent and extraneous variables and Descriptive survey tends to identify the phenomena whose variance a researcher wish to describe. There could be many ways in which questions can be constructed to elicit the required data. However, in general, the Analytic survey uses closed-ended questions, and Descriptive survey uses open-ended questions. A combination of both closed-ended and open-ended is used in many types of research. It demands the identification of variables and their relationships, along with identifying the phenomena that need to be described. Both types of open and closed-ended bring a focus to the phenomena being investigated and to analyse the data through different scales such as nominal, ordinal, interval and ratio scales.

- **The nominal scale** is used to label variables without any quantitative value. Those are such questions that can have qualitative answers such as What is your gender? (M-Male, F-Female). Analysing those type of answers does not require numbers such as 1 or 2.
- **Ordinal Scale** is the scale that measures the order of level of importance of significance. Likert Scale is one of the tools to measure the levels. It gives an order to the measurement. Such an order could be three, five, seven, nine or other point scales. A Higher number of points such as nine-point Likert scale can generate in-depth data but often confuse for respondents and for the researcher to analyse. Similarly, lower number three points scale are less likely to capture significant order of the data. For example, in the below question, a researcher is trying to capture the level of feeling with five points Likert scale

Question: How are you feeling today?	
1) Very Unhappy	○
2) Unhappy	◉
3) OK	○
4) Happy	○
5) Very Happy	○

- **Interval Scale** is the numeric scale that collects the data with order and differences between the values. For example, the difference between two temperatures 15 Celsius and 20 Celsius is 5 Celsius. This gives the measure between two values. The interval data can only be added or subtracted, and a ratio cannot be calculated between two values. However, it measures the central tendencies and can measure the mean, median and mode and standard deviation values.

In addition to the calculation of central tendencies, mean, median and mode and standard deviation, the **Ratio scale** is much more capable of providing a ratio between two values and calculates the coefficient of variations. It allows the opportunity of both the Descriptive and Inferential statistics such as the ratio between height and weight.

Table 5 below gives the difference between the different scales.

Table 5: Difference Between Scales

Provides:	Nominal	Ordinal	Interval	Ratio
The "order" of values is known		✔	✔	✔
"Counts," aka "Frequency of Distribution"	✔	✔	✔	✔
Mode	✔	✔	✔	✔
Median		✔	✔	✔
Mean			✔	✔
Can quantify the difference between each value			✔	✔
Can add or subtract values			✔	✔
Can multiple and divide values				✔
Has "true zero"				✔

Source: http://www.mymarketresearchmethods.com

7.4 Sampling

The third stage is to define the sampling strategy. In this, a researcher defines the target population and the means of assessing the representative samples. It is a process of selecting the representative group of cases from the relevant population. It starts with defining the relevant population for the study. It requires identifying a sampling frame that can be done in some ways. A sampling frame is the list of all the items that are the source of the material (in which the sample is drawn). In a simple term, it is a list of groups or individuals in the target population. Defining the sampling strategy is essential to save time and cost of the research. Different methods such as Random Sampling, Judgmental Sampling, Convenience Sampling are used for sampling. Figure 24 below exhibits the different sampling techniques that are discussed below.

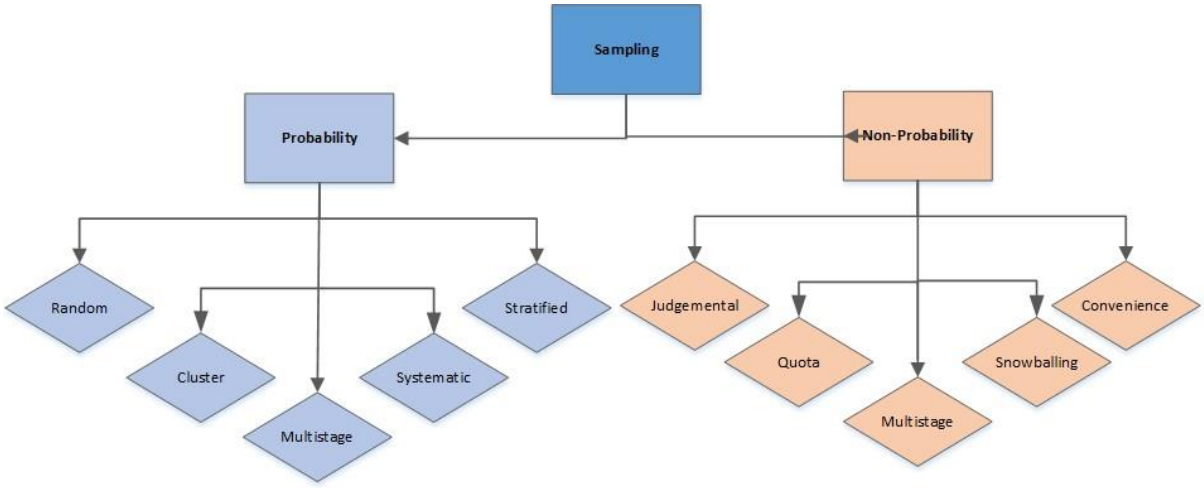

Figure 24: Sampling Techniques

The bigger the sample, the more regular the distribution of sampling means (central limit theory) and the more reliable and generalisable the findings. Sample size can be calculated systematically by the application of standard formulae. The calculation of sample size depends on the size of the target population, acceptable margin of error, confidence level and response distribution.

A target population is the number of people to choose from the total population. The margin of error is the amount of tolerable error in the data. The confidence level is the amount of tolerable uncertainty in the data. The response distribution is the variation between the expected results and actual results.

Sampling Methods can be classified into one of two categories, **Probability Sampling** and **Non-Probability Sampling.**

In Probability Sampling, the sample selection probability is known. Whereas, Non- probability Sampling, the sample selection is not known as it is based on the convenience or voluntary response surveys.

7.4.1 Probability Sampling

In probability sampling, a researcher can determine which sampling units belong to which sample. Linking the samples with sample units, the probability of each sample can be determined. Probability sampling has different sampling methods such as Random Sampling, Stratified Sampling, Cluster Sampling, Systematic Sampling and Multistage Sampling.

I. Simple Random Sampling

A Simple Random Sampling is when each sample has equal opportunity/probability of being chosen. For example, in a group of 25 people, you choose 5 people randomly as a lottery system. In that case, each one of the 25 people has 5 equal chances/probability of being selected.

II. Stratified Sampling

Stratified Sampling is the technique when a large group or population is divided into small groups (called Strata) based on shared characteristics of people and the variables that are being measured. In Stratified Sampling, the total population is partitioned into several groups to obtain data through a Random Sampling from each group. Once the data is collected from each group, the samples are combined to produce results. Stratified Sampling is useful when a target population has different characteristics (Heterogeneous population). That heterogeneous population (people with different characteristics) should be divided into homogeneous groups (people with similar characteristics). This helps to produce more precise statistical estimates while employing Simple Random Sampling.

III. Cluster Sampling

Cluster Sampling technique looks quite similar to Stratified Sampling. In Cluster Sampling, the target population is divided into micro populations, whereas each micro group is heterogeneous.
In Cluster sampling, the groups are NOT divided as per the standard views. The groups remain heterogeneous.
Once the groups are divided, the Random Sampling technique is used to obtain the data from all possible clusters. In which, the data is obtained from each sampling unit in each of the randomly selected clusters.
In most cases, a Stratified Sampling technique is preferred over Cluster Sampling, as Stratified Sampling offers precise data based on each variable. Whereas, if Cluster Sampling is used the nature of data will remain the same and will not be as precise.

IV. Systematic Sampling

Systematic Sampling also uses Random Sampling Technique. However, in Systematic Sampling, the Random Sampling technique is adopted on a larger population but in the fixed periodic interval. For example, you are researching "What is the impact of Brexit on British People during the negotiation period".
In this case, the negotiation period could be 2 to 3 years, and the target population is the British People. The impact of Brexit on British people would change/vary over time. Therefore, a Systematic Sampling would be beneficial to measure the impact after a fixed periodic interval such as 6 months.

In this case, the entire population is divided by the number of intervals. For example, let's assume;

The total target population is 50,000

The total period of research is 5 years = 60 months

Assumed fixed periodic interval (FPI) is 3 months The total FPI will be = 60 / 3 = 20 Intervals.

Target population for each FPI will be = 50,000 / 20 = 2,500 samples

V. Multistage Probability Sampling

Some research may demand Multistage Sampling, that is merely adopting more than one Sampling technique for Probability Sampling.

- Non-Probability Sampling

Non-Probability Sampling technique is a process that does not provide equal chances of selection to all the individuals. As given in Figure 12 above, it has Convenience Sampling, Judgmental Sampling, Snowballing Sampling, Quota Sampling and Multistage Sampling.

VI. Convenience Sampling

Convenience Sampling is the most straightforward sampling technique, among others. In this, a researcher only selects easily accessible individuals. In Convenience Sampling, the subjects are recruited just because they were easy to recruit. This is the cost-effective and least time-consuming technique.

VII. Judgmental/Purposive Sampling

Judgmental Sampling is also known as Purposive Sampling, whereas the subjects are chosen with a specific purpose. This technique is used when a researcher thinks that some subjects are more appropriate (comparing to others) for answering the questions. Comparison of the subjects could be based on the characteristics of individuals or the variables being measured.

VIII. Snowballing Sampling

Snowballing sampling technique is used in the case of small population sizes. In this technique, the researcher asks the initial subject to recommend more individuals (who meets the research criteria) for further data collection.

IX. Quota Sampling

In Quota Sampling, a researcher tends to sample an equal or a proportionate population. In the case of several large populations or groups with distinct characteristics or variables that are being measured. If

the group size is large, an equal or proportionate quota can be applied to each group to represent the samples. For example; if the population size is 1,000 that is divided into 4 groups based on its characteristics such as, 500 Project Managers, 250 Quantity Surveyors, 100 Civil Engineers and 150 Contractors. A researcher may allocate an equal quota of 25% from each group for sampling. In that case, the sample size for each group would be;

25% of 500 Project Managers = 125 individuals

25% of 250 Quantity Surveyors = 63 Individuals (rounded figure)

25% of 100 Civil Engineers = 25 Individuals

25% of 150 Contractors = 38 individuals (rounded figure)

Total Sampling units= 125+63+25+38 = 251 individuals

X. Multistage Non-Probability Sampling

Similar to Multistage in Probability Sampling, adopting more than one sampling technique is Multistage Sampling.

7.5 Data Collection

After determining the sampling strategy, the next step is to determine the data collection strategy; as an exhibit in above Figure 11, the questionnaire could be self-administrated of respondent's administrated. A researcher should decide how the questionnaire should be administrated.

7.5.1 Quantitative Analysis

There is a wide range of statistical techniques available to analyse quantitative data, from simple graphs to show the data through tests of correlations between two or more items, to statistical significance. Other techniques include cluster analysis, useful for identifying relationships between groups of subjects where there is no apparent hypothesis, and hypothesis testing, to identify whether there are genuine differences between groups.

I. Descriptive Analysis

Descriptive analysis is the simplest way of describing the statistical data through text. It gives information about what data is presenting.

A descriptive analysis is used to define the nature of data and describe the difference and similarities between the values. It also helps to describe the stand of a particular data value in comparison with other values. Below is an example of descriptive analysis.

A researcher asks a question about the size of the organisation of the respondents. The Table 6 below presents the 'Respondent's Size of Organisation' gives how many responses were from which size of the organisation.

Table 6: Respondent's Size of Organisation

Respondent's Size of Organisation		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	Micro (1 to 9 employees)	26	37.7	37.7	37.7
	Small (10 to 50 employees)	13	18.8	18.8	56.5
	Medium (50 to 249 employees)	18	26.1	26.1	82.6
	Large (250 and above)	12	17.4	17.4	100.0
	Total	69	100.0	100.0	

Descriptive Analysis: based on the frequency analysis on the respondent's size of the organisation, the highest numbers of respondents (26) are recorded as 37.7% are from Micro (1 to 9 employees) firms. The second-highest number (18) recorded as 26.1% of respondents are from Medium (50 to 249 employees) firms. Rest 18.8% of respondents are from Small (10 to 50 employees) firms, and 17.4% of them are from Large (250 and above employees) firms.

This data can also be represented graphically while using histograms, bar graphs and pie graphs. Graphically, the data is explained by compiling it into a graph, table or other visual representation. An example of graphical representation is given in Figure 25 below.

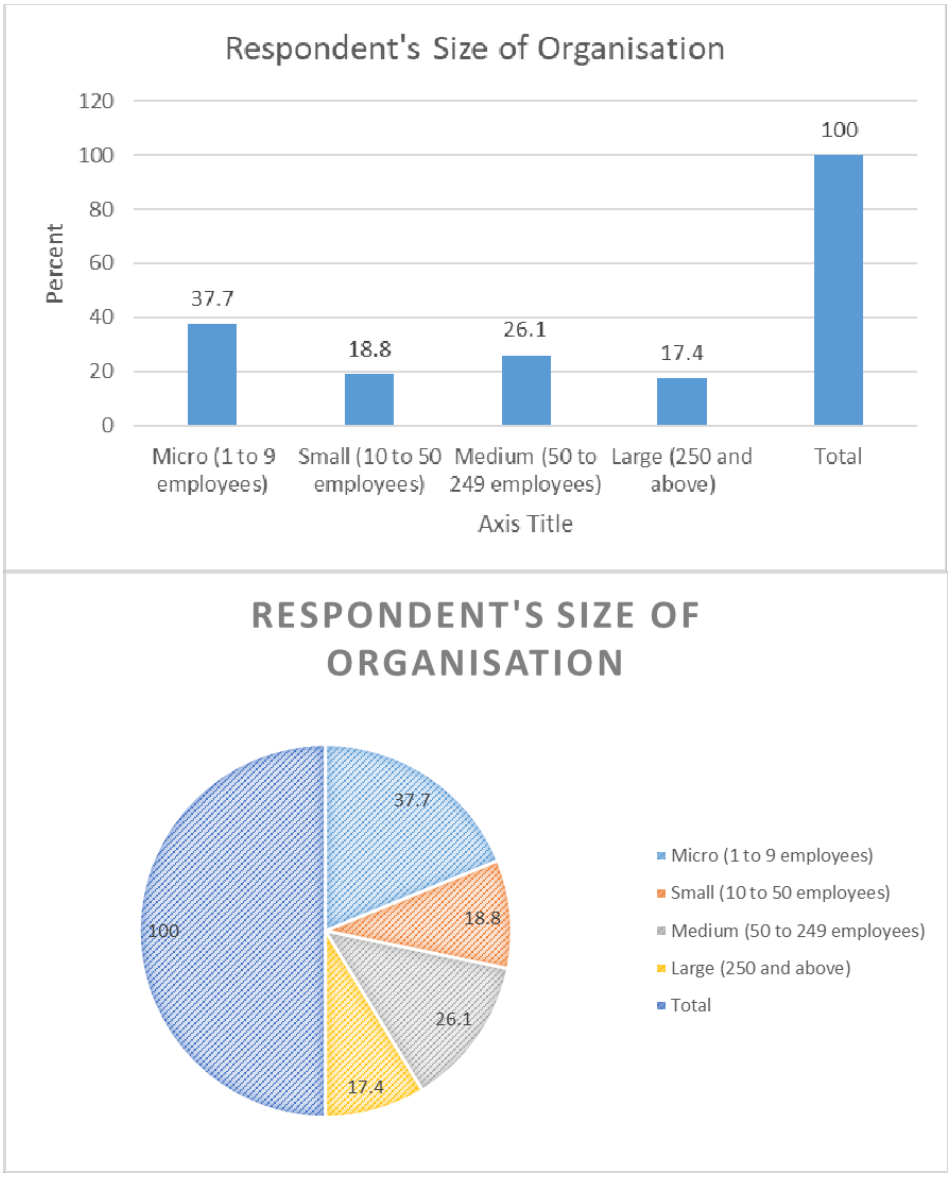

Figure 25: Data Presentation

Descriptive analysis is a quick method to compare the different type of data. The graphical representation gives the opportunity to visualise the smallest and largest values and trends.

II. Inferential Statistics

Inferential statistics are used to generalise and make judgements of the probability from the data what the population might think. It looks at the probability while observing differences between groups. Inferential statistics also help to proceed from general premises to a necessary and specific conclusion. To conclude accurately, inferential statistics measure the location (such as averages, mean, median, mode) and a measure of spread (such as Range, Variance and Standard Deviation) of the data.

III. Averages

Average informs about the size of the effect of what is being tested, whether it is large or small. Mean, Median and Mode are three types of measures of average.

When a researcher talks about the average that represents the Mean measure, the mean value is calculated by obtaining all the data values and can be used for further statistical analysis. Simply, the mean is the average of the numbers. This is a calculated central value of a set of numbers. For example, add up all the numbers, then divide by how many numbers there are.

Researchers sometimes use the median instead of Mean. That is because Mean value could be an oblique value which represents the results weighted on one side. The median value is the mid-point of all the data. The median is not oblique or skewed, but with Median value, further statistical analysis is complicated.

The data need to be organised from lowest to highest before calculating the Median average. Afterwards, find the two average numbers, add them and divide by 2.

The mode is the standard value in a data set that is useless for further statistical analysis. The values of mean, median and mode are different, which is why it is essential to be clear which 'average'.

Watch the video to learn more about calculating Mean Median and Mode.

https://www.youtube.com/watch?time_continue=234&v=k3aKKasOmIw

IV. Spread

Range, Variance, Quartiles and the Interquartile range and Standard Deviation are different ways to look at the measure of the spread of a data. The spread measure helps to describe the similarity or difference between the set of observed data of a variable.

Simply, a range is a variation between the most significant and smallest values. Researchers often quote this the interquartile range, which is the range of the middle half of the data. In which the first 25%, the lower quartile, and the last 75%, is the upper quartile of the values. Therefore, the median is 50% value. It describes the middle 50% of values when ordered from lowest to highest. To calculate the interquartile range, first, find the median (middle value) of the lower and upper half of the data. In other words, find the quartiles, use the same procedure as for the median, but take the quarter- and three-quarter-point instead of the midpoint.

Watch the video to learn to calculate the range or interquartile range
https://www.youtube.com/watch?time_continue=166&v=qLYYHWYr8xI

The standard deviation measures the average spread of numbers around the mean. It gives the sense of the 'typical' distance from the mean. The standard deviation is used to determine the population of values within a specific range of mean value with data that has a normal distribution.

To calculate the standard deviation, the square root of the variance is calculated. However, manually calculating standard deviation is a prolonged process. There are high chances of mistakes due to the complexity of the equation. Therefore, the use of computer applications is suggested to calculate the standard deviation.

Watch YouTube video to learn calculating Range, Variance and Standard Deviation
https://www.youtube.com/watch?v=E4HAYd0QnRc

6.6 Quantitative analysis tools

Further statistical analysis is based on calculating the average and spread measures of the data. These are the prime measures for a dataset. The choice of measures depends on the nature of the data. The computer application such as SPSS can be used to analyse quantitative data.

7.6 Summary

This article was set to develop your understanding of the design and implementation of quantitative and quantitative research methods. In this article, different approaches to Qualitative and Quantitative research are briefly discussed. Having in-depth knowledge of Qualitative and Quantitative research design, collect data, analyse, draw conclusions to write your research report is essential for a researcher. Gathering and analysing data is a systematic process of conducting a statistical or logical analysis to describe, explain, illustrate and evaluate the information. Data analysis is used for generalising the different or similar viewpoints of people or developing a specific point of view. Either it is Conceptual or Empirical, Pure of Applied, Industrial or Academic, all type of research uses two main types of data analysis methods are the Qualitative and Quantitative Methods. Both methods have unique properties that are used for the search for knowledge. Based on the different characteristics, both types of research demands a different set of skills.

Qualitative research provides the opportunity for in-depth study and often seen as an inductive approach. Qualitative Enquiry is used to find answers to 'Why' and 'How' of human behaviour, experience and opinions. This technique focused on the words and collected data through different techniques, such as interviews and group discussions. Qualitative data can be used for all type of research and can be employed to a different kind of research strategies such as experimentation, investigation, Case Study,

action research, grounded theory, ethnography, and archival research. On the other side, Quantitative research is a means of testing objective theories or prior formulations by examining the relationships among variables. Quantitative Method aims to quantify perceptions, experiences, attitudes or behaviours, measure variables on which they hinge, compare, and point-out correlations. Quantitative Method is often conducted via a survey on a representative sampling so that the results can be extrapolated to the entire population studied. Quantitative Method requires the development of standardised and codifiable measurement instruments through structured questionnaires.

7.7 Activities

Select the right answer to fill the blanks.

- Quantitative research is leaning towards the paradigm.

  ○ Positivist ○ Anti-positivist

- The positivist approach is considered as an approach.

  ○ Deductive ○ Inductive

- Reliability is also considered as _____ of the data.

  ○ Validity ○ Consistency

- Cronbach Alpha is a measure of the consistency of the data.

  ○ Internal ○ External

- A Quantitative Research has positivist philosophical foundations in which the world is, and the research is value-free.

  ○ Internal and Objective ○ External and Objective

- A quantitative research design is the standard experimental method to collect the quantitative data for.

  ○ Hypothesis Testing ○ Hypothesis Building

- The _____ approach follows a robust process for testing theory or the hypothesis that requires valid and reliable measures.

  ○ Deductive ○ Inductive

- In _____ Sampling the subjects are recruited just because they were easy to recruit.

  ○ Judgmental ○ Random ○ Snowball ○ Stratified ○ Convenience

Is the below statements True or False?

The field experiments are conducted in an artificial setting.

O True O False

A quantitative experiment must be carefully planned.

O True O False

A quasi-experiment is similar to a traditional experiment except for the random assignment.

O True O False

In research design, a researcher does not need to explain the hypotheses and the process of reaching the hypothesis.

O True O False

Quantitative surveys are an efficient method to collect a large amount of data in a short period.

O True O False

The analytic survey demands identification of independent, dependent and extraneous variables.

O True O False

A robust conceptualisation and structuring the problem is not important for the design of valid surveys.

O True O False

Sample size can be calculated systematically by the application of standard formulae.

O True O False

Select one or more appropriate answer.

Which of the below-listed sampling technique falls into Probability Sampling classification.

- ☐ Judgmental
- ☐ Random
- ☐ Snowball
- ☐ Stratified
- ☐ Cluster

Select one or more appropriate answer.

What type of data can be collected while employing a Likert scale?

- ☐ Ordinal
- ☐ Nominal
- ☐ Ratio
- ☐ Interval
- ☐ None of above
- ☐ All of the above

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Useful Websites

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https://www.revolvy.com/

https://onlinecourses.science.psu.edu/stat100/node/18

CHAPTER 8

WRITING A RESEARCH PROPOSAL

8.1 Preface

A research proposal is a first and most important step for research to demonstrate the intent of investigation. A research proposal is an essential document for most type of research. It is needed for academic research for Masters and PhD students and for any research that seeks to fund either its academic or industrial research. It demonstrates the research intent and the knowledge and understanding of the researcher about the topic. A research proposal is a prime chance to convince the reader about the importance of the study. A research proposal is often rejected is it fails to present the theoretical and empirical contributions by others. A proposal needs critical academic writing skills. Many proposals are rejected if those fail to support the arguments while addressing the landmark studies, fails to provide appropriate citation and correct references. The proposal also become unattractive if it gives too many or too fewer references.

It is a structured document in which each section is essential. The discussion between sections is interlinked and aligned to attract the reader. However, many research proposal fails to convince the reader if those do not provide a clear research context or the writing is sloppy. Therefore, a research proposal must develop a coherent and persuasive argument for the proposed research. Moreover, unfocused aim and objectives, unclear research scope and limitations also demonstrates that the study lacks a clear sense of direction.

This document provides a clear direction and guidance to write a convincing and persuasive research proposal. Through this paper, a researcher would be able to write a compelling, concise, coherent and complete research proposal for the dissertation module.

8.2 Introduction

Research Proposal is a document that demonstrates a researcher's intent and understanding about a research topic and the planning for executing the research. A research proposal evidence that a researcher fully understands the research topic, research methods, research strategies, research resources and limitations and the research planning. A research proposal is written to convince the audience that you fully understand the research project. To a researcher, the research proposal writing provides an opportunity to reflect on the challenges of undertaking the research. Through a research proposal, a researcher demonstrates the ability to plan and execute the research project.

Not just Academic but most types of research require a research proposal. Writing a convincing research proposal is the starting point, not just for postgraduate students (such as Masters and PhD) but also the established researchers who seek to fund research. A good proposal is the only way to convince funding organisations that you have the capability and capacity to conduct research.

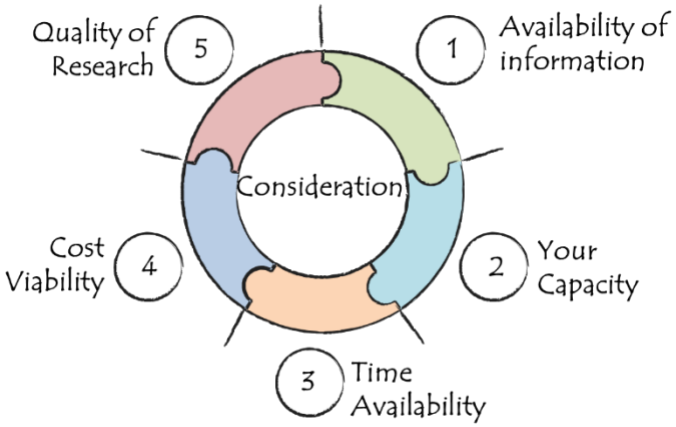
8.2.1 Starting Points

As discussed in Chapter-2, the Literature Review is the starting point for developing an understanding of the research. Even if a researcher has a theory, a question or a hypothesis that need testing, Literature Review is essential to support the theory and to develop the Research Design. A literature review helps to determine whether the subject is in within your ability to conduct research and within your subject domain at postgraduate level.

Considering your capacity to perform research on the chosen topic is essential. Your ability here is based on the subject knowledge and understanding of the researcher, the research project duration (mostly three months for academic dissertations), the resources available and the researcher's commitment. Often student chooses the topics that need higher capacity than a Master level student. Those research can have a higher failure rate. For instance, you select a complex research topic that demands a long duration of the study which University may not agree to provide.

Such as your topic is, "Measuring the impact of immigration on the UK's small scale industries during the Brexit negotiation period".

This topic demands to measure the impact of immigration during the negotiation period. As of now, no one is sure about the duration of the negotiation period, but the minimum guess is two years. Because you have only three months to complete your research project, time-wise, you do not have enough capacity to fulfil this research.

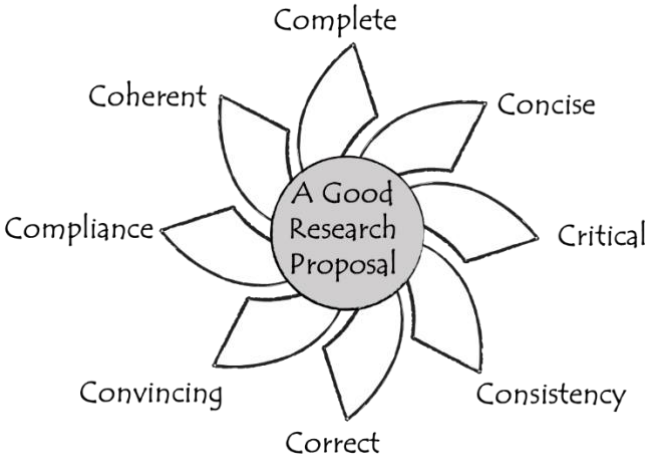


Likewise, you also need to look at other control factors such as Cost and Quality of research. Some researchers may demand heavy equipment. For example, your research idea is to understand the architecture of St Peter's Collegiate Church, Wolverhampton. The equipment's you need is a number of laser scanners. The cost of buying or even for hiring the laser scanners, may not worth for a dissertation research project.

Moreover, a researcher should also be aware that substantial information about the topic is available. Many students often make this mistake of saying that there is no data or literature available on their topic/idea. Very only, if there is no data or documentation available related to the topic, that topic needs reconsideration as it may not worth researching. As discussed earlier in CHAPTER-4, it is highly unlikely that someone in the world has not studied on the same of similar topic.

8.3 Structure of a Proposal

Proposal writing should be considered as a project that needs a systematic approach.



Although a research proposal does not have a genetic structure of a research proposal that may vary based on the type of investigation Mostly universities and organisations that fund the industrial or academic research have a prescribed structure for a research proposal. However, there is no significant difference in the compositions. Generally, a research proposal should contain all the

vital elements of the research process. The structured approach is to ensure that a researcher provides sufficient and necessary information that helps the readers to evaluate the proposed study.

The structured approach to a research proposal ensures that the information required is **complete**. The research proposals often have prescribed word limit for each section that allows writing a **concise** proposal. The critical elements of a research proposal are chained together to bring **critical** writing style and **consistency** to the information provided. The structure also offers the researcher to establish the **correct** system to **convince** the readers about the research plan. As said above, a prescribed structure ensures that a proposal **complies** with the objectives or rules set by the University or other organisation. Overall, a structured approach to a research proposal brings a **coherent** approach to the research proposal ensure to provide complete but concise information that has a critical review of consistency, compliance and coherence.

The structure of a research template can have several sections. The University of Wolverhampton Research Proposal template has eight sections, as demonstrated in Figure 26 An overall proposal has a maximum limit of 3000-words excluding research programme, references and appendix sections. Each of the eight sections is explained below.

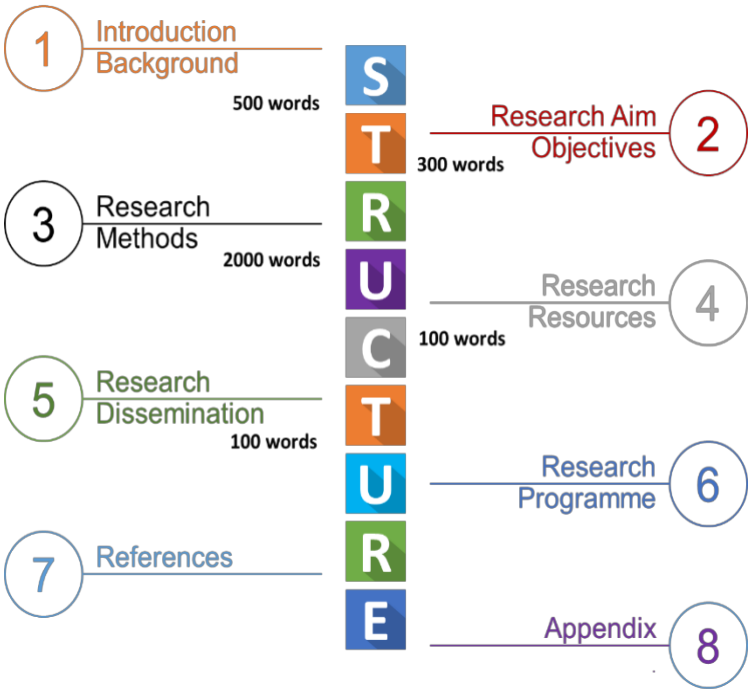


Figure 26: Structure of a Research Proposal

8.4 Writing a Research Proposal

8.4.1 Introduction and Background

This section introduces what your research is all about and explain the context and rationale of the study. As discussed in Chapter 3 section 1.2, an introduction gives the prime impression of your arguments and your overall quality of the work to the reader. Therefore, an opening must be concise, that sets the scene and context that justifies the research and convince the reader. An introduction part of a research proposal should concisely convey substantial information. It should present any hypothesis or theory or any research questions you may have. Further, this section gives the background of the research that provides evidence that supports your research hypothesis, theory or question or research problem. As discussed in CHAPTER-

3, section 1.2 and section 2, critical writing should incorporate reference to provide evidence. Writing an introduction section can be challenging if the researcher lacks the knowledge of introduction writing, especially that has a word limit. As per the proposal template and guidance, this section should not exceed 500- words that are including references. An example is established below that Example 1 provides essential information about a research project and its background. For discussion purpose, this example is divided into four parts that have a total word count 530-words.

In this example, the research project is set to "Advancing of User's Satisfaction in Highways England through Big-Data Optimisation". The first line of the introduction gives the issue/problem that catches the reader's interest. Then it provides convincing background information about the impact of traffic delays and on user satisfaction and the British Economy. A study supported by relevant sources establishes the correctness of data and the reliability of the sources of information. It concisely provides some facts/reasons that convince the reader about the decline of overall user satisfaction. This introduction is an excellent example of in-text reference (see Chapter-3) technique.

Title	**Advancing of User's Satisfaction in Highways England through Big-Data Optimisation**
Example- Part 1	The issue of highway improvement in England is receiving considerable critical attention in terms of efficiency improvement. That demands; advance understanding of the complexity of a highway improvement scheme. The focus is to prevent collision, improve road safety and improved user satisfaction. This is because; too much traffic delay is damaging the British economy (IEA, 2015). The cost of a two-minute delay to every car journey equal 1% of the UK gross domestic production (CIPS, 2016, p-16). The National Road Users Satisfaction Survey (Highway England 2015) and (AECOM 2015a) finds out; the key driver of dissatisfaction is delay over five minutes. The rollover of smart motorways and roadworks increased part of long delays. Highway England (HE) measures the user satisfaction in four general areas – safety, roadworks, litter and congestions and reliability. In 2014-15, the overall satisfaction is declined because of congestions (AECOM 2015c), lengthy stretches and reduced speed (HE, 2015). *Continue in part 2 below*

In part two of the example, the author provides supporting evidence to the background information provided in part 1 above. That uses the appropriate sources that provide concrete facts and figures from the current sources. That evidence is also used to bring out the factors that contribute to lower user satisfaction. In addition, it portrays the scene for the importance of the research.

Example- Part 2	The recent study (AECOM 2015a; 2015b and 2015c) concludes the performance measure for all journeys was 89.63 in year 2013/14, which indicates a high level of satisfaction. About 90% of respondents were delighted with their journey. The safety has the highest score (92.50), followed by information provision, (90.50), and roadworks management has the lowest satisfaction score at 71.73. The survey concludes that insufficient information about the scheme raises safety concerns (AECOM 2015b). Moreover, the information provided through the Visual Management System is inadequate. This portrays three main reasons for lower user satisfaction- • Long stretches and speed limits, • User not seeing work in progress and, • Deficient user awareness about the work is taking place and why. Therefore, the issue mentioned above of inadequate information for the user, the role of big-data in highway improvement is receiving increased attention across several projects. *Continue in part 3 below.*

In part 3 of the example, justifies the need for research and gives a critical discussion about big-data and its usage for advancing the user satisfaction and looks at the pros and cons of it.

Example- Part 3	This is because; an arising body of literature recognises the importance of big data and data management for HE. However, the collection frequency and scale of highway data are diverse and disjoint. Moreover, the volume and speeds at which data today is generated, processed and stored are unprecedented. However, adverse practice in data collection fundamentally discourages the efficiency of the transport sector from advancing the user's experience. Since highway data is collected through a diverse range of channels, the inessential information makes it challenging to manage (POST, 2014). Even though joining and optimising data from different channels is a complex problem. Still, big-data have potential to advance road user satisfaction. This is because; big-data assures that high-quality information is readily available in a digital environment. However, that assurance is fiddling until the data is un-optimised. Therefore, big-data is unfit for purpose that produces the desired results. *Continue in part 4 below.*

After discussing the pros and cons of the final decision or the study focus are portrayed in part 4 of this example.

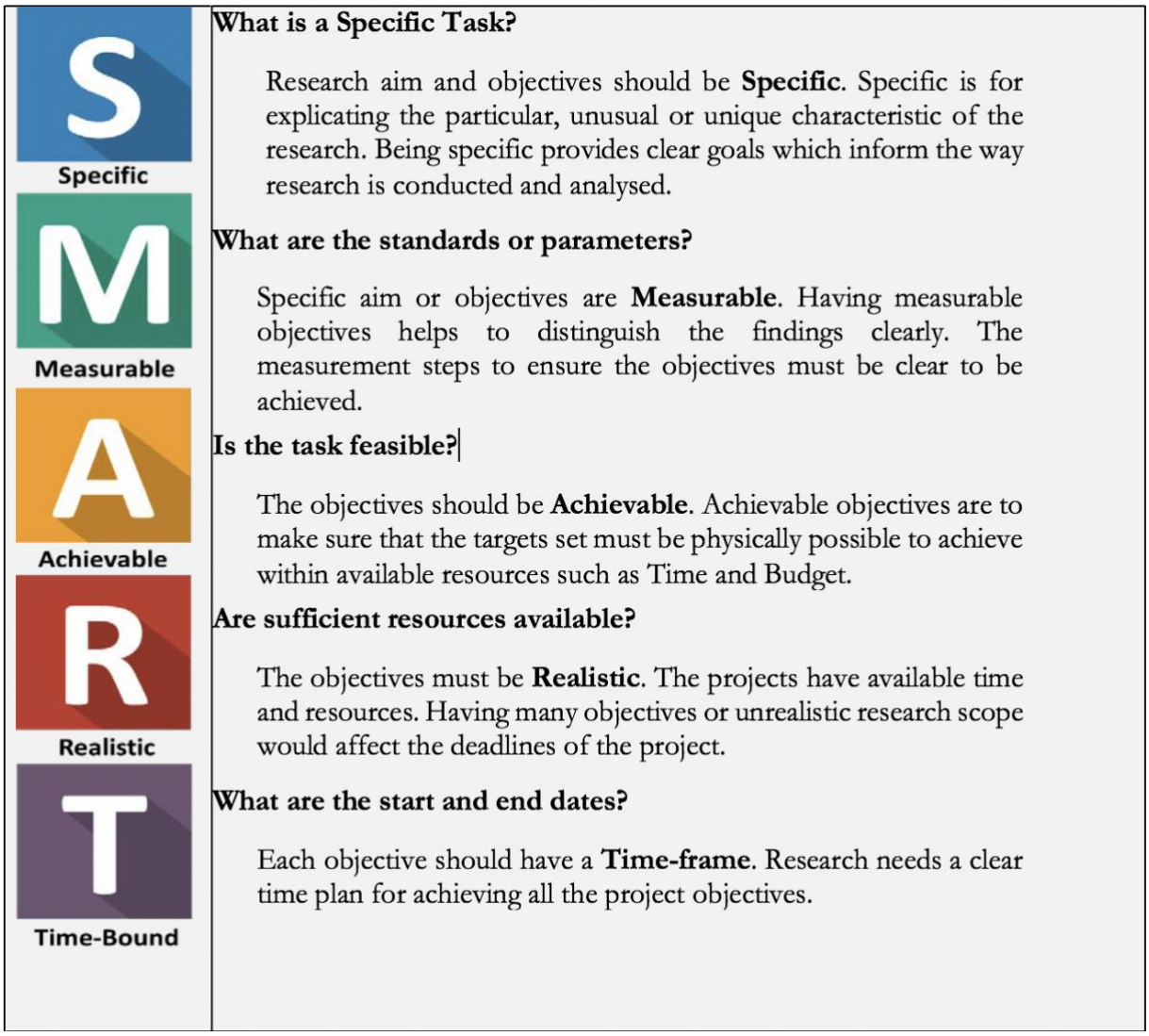
Example- Part 4	Data optimisation is a process of the logical schema that fetches, filter and logically joins the multiple data sources to develop an advanced set of data that fits the purpose. However, the definition of data optimisation varies in, unlike disciplines. Aforementioned, a combination of multiple data sources becomes big- data. In highway user's satisfaction, main lines of evidence fall into four categories, traffic data, roadway data, road edge data and roadside data. Therefore, this study focuses on optimising multiple data sources that can help to advance the highways improvement scheme, and consequently improves road user's satisfaction.

The overall example, establish that the introduction section of a research proposal sets the whole scene of the studies concisely and coherently. Introduction section should convince the reader about the importance of the research. Nevertheless, this example shows that an introduction section has a structure that provides a flow of reading while adopting a critical writing approach.

8.5 Research Aim and Objectives

This section is to state the general research aim, measurable objectives and hypotheses (if appropriate), and explain why those objectives are important in the context of the study. This section is limited to a maximum of 300 words.

As stated above, a research proposal should be coherent. Therefore this section carries forward the main focus or need for study and brings out the SMART objectives to achieve the aim of the research. Research objectives must be Specific, Measurable, Achievable, Realistic and Time-Bound. The SMART approach to developing the research objectives is necessary. This method brings unobstructed views to the reader that the research objectives are achievable. If the research objectives are not clear, measurable, realistic and achievable, there is a high possibility that a research proposal will be rejected.



Writing the research aim and objectives in this section does not have a prescribed way. However, it is suggested that the aim and objectives must be unique, clear, concise and incoherence. The aim of the research is generally a one-sentence statement of general research aim that elaborates the research topic. For example,

> **"The purpose of this research project is to develop a logical schema to optimise big-data that assure highway's improvement and a higher degree of user satisfaction."**

Based on this aim, it requires SMART objectives. As stated above, objectives must be unique, clear, concise and incoherence but most importantly Measurable, Achievable, Realistic and Time framed. There is no set answer about how many objectives research should have. As discussed earlier in CHAPTER-1 and other documents, all research is unique that demands a different set of objectives. The number of objectives can differ from study to study. However, having many objectives for research are always questionable in terms of resource availability and achievability within the time-frame. Keeping the numbers of objective between 4 to 6 is justifiable.

For example, the objectives for the below aim could be-

Aim	**The purpose of this research project is to develop a logical schema to optimise big-data that assure highway's improvement and a higher degree of user satisfaction**
Objectives	The project will address the following key areas • To investigate the current state of data collection and data life cycle • To identify tools and techniques of data filtration and optimisation to apply with Building Information Modelling • To conduct a Gap analysis: current state against data handling best practice • To address potential efficiency improvement in the collection of data that help to optimise data and blends with BIM • To recommend possible tools and techniques to visualise the user satisfaction related improvement possibilities

Example 2: Writing Research Aim and Objectives

In this section of a research proposal, stating just aim and objectives is not enough. The readers need clarity on how each objective will be addressed. That need a short discussion about your approaches to fulfil each objective. The debate of those approaches will carry forward to the

Methodology session of the research proposal. Below is an example of a discussion on how will the above-stated aim and objectives be fulfilled.

Example: To fulfil the aim and objectives mentioned above, the logical scheme for data optimisation would require value stream mapping of data collection. That would provide the understanding of the meta-data, relationships and loose ends within the current practice of data collection. The research process takes five stages. Firstly, this study needs an investigation of the current practice of data collection to analyse and interpret user's satisfaction that aligns with key point indicators (KPI's) set for user's satisfaction. Secondly, the current critical success factor that advances the user's satisfaction needs an investigation to identify the gap against current state against data handling best practice. Afterwards, it requires identifying the challenges faced in enhancing the user's experience. In-depth investigation of those challenges would help this study to identify, which data sources are essential to mitigate those challenges. At stage four, data from different sources will be analysed and optimised to fit for purpose while adopting BIM approach.

Example 3: Discussion about Research Objectives

8.5.1 Research Questions

If research has a research question or theory or hypothesis, that must be discussed in this section. Some students tend to convert research objectives to research questions. For example, the above research objective one is converted to a question- "What are the current state of data collection and data life cycle?" That is ok, but not necessary as it is understood from the statement given in the objective section. Instead. The researcher should focus on the discussion about the research objectives.

8.5.2 Research Method

As stated above, the discussion about the approach to fulfilling each objective will be continued in this section to explain and justify, the proposed research method/s that is appropriate to your research objectives. For refreshing the understanding of research methods, revisit chapter 4. This section is to give a concise analysis of your Research Design. This section is the core of the research and the research proposal. You can also consider this as the main body of your essay that demands Critical Reading, Thinking and Writing Skills (see CHAPTER-2). The research choices made in this section need supporting evidence with appropriate references (see CHAPTER-3) and the critically discussed justification. The research Methodology section is a

crucial part of the research proposal. That is why this section has the highest word limit up to 2000-words.

Before writing this section, a researcher must review the literature of research Methodology to advance the understanding and knowledge of appropriate methods. As stated above, research methods must be aligned with each research objective.

For example, the first research objective in above Example 2, is "to investigate the current state of data collection and data life cycle". To fulfil this research objective the study demands an investigation of the current practice of data collection to analyse and interpret user's satisfaction that aligns with KPI's set for user's satisfaction (as discussed in above Example 3). In this section, the research methods to be addressed that can satisfy the demand for this objective. You will also need to critically discuss all available options to draw the most appropriate choice for this objective logically. Your outcome from the critical discussion will require supporting evidence (references). The same approach should be taken to address research methods for each objective.

To establish the choices, a researcher should follow the research methodological framework such as 'Research Onion to develop a research paradigm for each objective'. Setting the research philosophies is the first step for a Research Design (see Chapter 4, section 7.1.1). Once the ontological poisons are established, it needs determining the logical approach for the objective. It is to determine if the research objective needs Inductive of Deductive approach. The choice of research approach leads to the selection of an appropriate research method/s to fulfil the research objective. The same approach should be taken for each objective.

This section is to extend the debate for appropriate data collection tools and techniques and data analysis tools and techniques. For example, the above-stated objective one needs a qualitative data collection. The data could be Primary data (see Chapter-2,). The two crucial consideration a researcher should discuss here is

- What Primary data is requiring and why?
- What are the Primary source, and why?

Both considerations must be aligned with the philosophical choices, research approaches and research strategies that are established earlier. References are crucial to support your decisions. Moreover, the methodological discussion must provide a strategy for data analysis. That should consider which data analysis tools and techniques are appropriate to fulfil the objective. For example, you need to collect qualitative data from Primary sources to meet the above-stated

objective 1. The important considerations here are; to establish what you will do with quantitative data? Such as,

- What is the most appropriate tool for data analysis among several options available?
- What analysis will you conduct through that tool?
    - How is that analysis appropriate to fulfil your objective?
    - Above considerations are to determine the most suitable tools and techniques for the data analysis. These considerations must be accounted to fulfil each objective separately.

In summary, the Figure 27 below demonstrates the checklist of writing the research method section for a research proposal. The list is not exhaustive. The purpose of writing this section is to convince the readers that the choice of research methods is the most appropriate that fulfils each objective.

Figure 27: Checklist for Writing Research Method Section

8.5.3 Research Scope & Limitation

The research scope is merely defining the area in which the study will be conducted. Such as geographical, temporal, organisational scope. Limiting the scope is essential to control the investigation. For example- the extent of research that aims to cover five different countries would be less controllable against the other research that is set to collect data from the UK only. Defining the scope of a study helps to limit the research and to bring focus. Limiting the study makes it controllable in terms of cost, time and quality. The other limitations could be the resources such as hardware, software and other equipment's required to conduct the study. The lack of availability of such resources could limit the investigation.

For instance,- a study is set to **develop a logical schema to optimise big-data that assure the highway's improvement and a higher degree of user satisfaction.** The geographical scope of the survey is the Highways England that is within the UK. The scope is further limited to investigate into the big-data domain. The organisation's scope of the study is the Highways England. To conduct this study, you may require Specific resources hardware, software, equipment, travel, to collect the data. Defining the research scope needs consideration about what type of limitations you could face in terms of access to data, data analysis, ethical/safety considerations. This will require logical interpretation while answering such questions.

- What if, Highways England does not provide relevant data?
- What if, they are not available for interviews?
- What are the ethical limitations?
- What else could be the limitations?
- Are there any alternative approaches (Plan B) to overcome the limitations?

In this section, a researcher should look at all dimensions of the scope and limitations to check if the resources are enough and available to complete the project within time.

8.5.4 Research Beneficiaries / Dissemination

This section is to explain the dissemination strategy, including beneficiaries, for the proposed dissertation and its findings. The primary purpose is to discuss how this research would contribute to benefit Specific communities such as practitioners, academics, policymakers, etc. If the research aims to output documents such as journal articles, industry reports, framework, process guidelines; should be addressed in this section. Moreover, this section should demonstrate how the output of the study has the potential to open a widespread discussion and debate.

8.5.5 Research Programme/Timeline

This section is the outline of the research programme. A research timeline or a Gantt chart which illustrates the principal activities of the research with milestone dates. For more discussion on presenting a research plan or timeline, see figure 2 of CHAPTER-4 in section 2.

8.5.6 References

Finally, the reference section is to provide a list of references of material, cited in this proposal, using the 'Harvard' referencing system. This section has no word limit. For discussion on referencing style, see section 2 of CHAPTER-3.

8.5.7 Appendix

You should attach a copy of your research proposal as an appendix, if not included in section 3.6 above. This section can be used to connect any supporting text that is not essential in the main discussion. However, any appendix must be cross-referenced where appropriate in the main discussion.

8.6 Summary

Research Proposal demonstrates a researcher's intent and knowledge about a research topic. It portrays a brief research plan that includes research methods, research strategies, research resources and limitations and the research planning. A research proposal is must be convincing, complete, concise and coherent. Moreover, it should critically discuss the appropriate research methods and reflects on the potential limitations of undertaking the research. It needs a structured and persuasive approach to catch the attention of the reader. Many research proposals are not accepted if the proper context to frame the research aim and objectives is not provided.

Developing the context of research must present the theoretical and empirical contributions from other researchers. While establishing a research context, a researcher should cite the landmark studies in the field of the investigation. However, if a research proposal is not focused on the main topic area, that would bring out unclear aim and objectives. Moreover, if the aim and objectives are not SMART, the research proposal is not acceptable. The discussion about the importance of those objectives is vital and that links to the research method section. The research method section must address each research objective and the most appropriate methods to fulfil the investigation. The research scope and limitation is established based on the choice of research methods for each objective. The research scope and limitations need a logical explanation about controlling the project within the scope and extending the reach for rich data collection.

Useful Reading

Jecinta, M., & Andrew, K. (2010). Academic Writing. *Journal of Political Economy*, (627 739).

Pumela Msweli. (2011). *Writing a Research Proposal: Practical guidelines for business students*. Juta.

Punch, K. F. (2016). *Developing Effective Research Proposals* (3rd ed.). London: SAGE Publication.

Shahryar Sorooshian., & Noor Azlinna Azizan. (2015). *Writing a research proposal : (for elementary research level)*. Penerbit Universiti Malaysia Pahang.

Stephen Bailey. (2011). *Academic Writing: A Handbook for International Students - Stephen Bailey - Google Books* (3rd ed.). London: Routledge.

Tayie, S. (2005). *Research Methods and Writing Research Proposals*. Cairo: Cairo University.

Vithal, R., & Jansen, J. (1997). *Designing your first research proposal : a manual for researchers in education and the social sciences*. Juta.

CHAPTER 9

WRITING A REFLECTIVE REPORT

9.1 Preface

Reflection is the process of thinking back, thinking forward, thinking inward and thinking outward at an activity or a process you were engaged in and consider the learning points from it. Reflection starts with thinking about something that has no immediate solution. We do not reflect on simple things such as the route to the classroom. It is not about where you are going to eat tonight, but it is to think about the experience you had last time you went out for eating. Reflective thinking is not about the subject matter (consumption). It is the thinking through which you learn to enhance the experience in future by looking back on your experience and reflecting on it.

Reflection offers the opportunity to consider how personal experiences and observations shape your thinking and your acceptance of new ideas. Students are often asked for reflective writing to explore your thoughts and express your opinion. A reflective essay requires expressing your thinking, and more importantly, why you think that way. Moreover, the reflective analysis is to acknowledge your thoughts that are shaped by your ideas. Through reflection, the views of others are appreciated and noticed, and further, recognise how you support or oppose the opinions of others.

From learning through this material, you should be able to enhance your writing skills for a reflective piece of work. You will learn about Kolb's and Gibb's models of reflective writing. Through those models, you should be able to recognise the different writing style according to the steps given in the Reflective Cycle by Kolb and Gibbs.

9.2 Introduction

Reflective writing is a personal process in which a person thinks reflectively in everyday life. It is a process of producing reflective writing from educational or practical experiences. However, it may not be in the same depth as that is expected in good academic writing at the university level. Reflective writing is considered as evidence of severe and profound thinking upon experiences. In an educational context, reflective writing involves looking back and analysing something that has happened. It is all about thinking carefully about an idea or event and what that means to you. As a learner, reflective writing is an ongoing professional practice. Reflecting on experience can help to make links between theory and practice and between the past and present knowledge.

9.2.1 Definition, Aim and Outcomes

Reflective writing is challenging than other forms of writing. Reflective writing involves writing about your feelings about a situation, idea or a process. It is often used to pull knowledge from a specific event, a lesson or a piece of literature. It is a critical strategy that helps to improve and develop precise thoughts and to advance critical thinking. There are several frameworks suggested for reflective thinking and writing, such as Kolb's (1984) Experiential Learning Cycle and Gibbs (1988) Reflective Cycle.

Gibbs (1988, p9) said, "to learn, experiencing something is not sufficient. As experience can be forgotten, or its learning potential may lose without reflection. Reflection generates. Generalisations or concepts. Through the feelings and thoughts are emerging from experience. Furthermore, it is generalisations that allow the new situation to be tackled effectively."

Reflective writing aims to help people learn from their experiences. Gibbs (1988) stated, people, learn from situations that they regularly experience, especially when these do not go well. If people do not reflect on their experience, and they do not think about how they can do better next time, makes it hard for them to learn.

9.3 Kolb's (1984) Experiential Learning Cycle

Experiential Learning Theory has its roots in the experiential works of Dewey, Lewin, and Piaget. Experiential Learning Theory tends to emphasise perception and learning and reasoning over the behavioural learning theories. In this theory, learning is the process whereby knowledge is developed or created by translating the experience. The experiential learning model is a process of learning through experiences. It has four stages in the cycle given in Figure 28 below.

Figure 28: Experimental Learning Cycle

9.3.1 Concrete Experience

Experiential Learning Cycle starts with the Concrete Experience. In other words, a person should have a substantial experience to reflect on and learn from it. That experience could be 'doing something' as an individual or a part of the team or an organisation. The theory consists that active involvement in a task is the key to learning and developing knowledge through reflecting on the experience. According to Kolb's Experiential Learning model, a person cannot learn by simply watching or reading about something. That means individuals and teams must be involved in the process to learn effectively. For example, you cannot learn to play football by merely watching it on the television. You will need to go to the field and practice football to learn effectively.

The stage Concrete Experience is all about what you did. For reflective writing, this stage is a starting point to describe what you did and write about how you did the activity, and what methods you have used.

9.3.2 Reflective Observation

The second stage in the Experiential Learning Cycle is about reflective observation. Reflective observation means stepping back to think seriously about your experience. Reflective observation can be done while taking time out to the task to review what has been done and experienced. This stage is to ask a question to yourself or the other team members while thinking about the experience. During this stage, you should be thinking about how you did it, what was your feelings and what else could you do to do it differently.

This stage is simply to evaluate your performance during the task. A person should also seek answer such as what happened, and why that has happened, and how well did you do. At this stage, a person can ask other team members for observation and feedback while doing the task and vice versa. This stage also requires writing a short reflective report about the experience to take it further for abstract conceptualisation.

9.3.3 Abstract Conceptualisation:

Abstract Conceptualisation is the third stage of the Experiential Learning Cycle. Abstract conceptualisation is about the understanding of the relationship between the events that have happened during the exercise. In this stage, the learner tries to make sense of what happened and make comparisons between the events and reflect upon that is already known. To explain and to form the facts, they learned by drawing upon the relevant theories from textbooks and model the ideas generated from the experience and previous observations.

For example, the knowledge you have developed from an event or experience should be thought seriously to extract the learning points. Afterwards, the existing models about the idea should be explored and then supported by the theories from the textbooks to present the facts about the knowledge.

9.3.4 Active Experimentation

Active experimentation is the final stage of the Learning Cycle. Klob suggested, at this stage, the learner should gather all the learning points from experience and make a plan to use those into practice. This stage all about considering how to put the lesson learned into practice. The experimentation planning enables to develop an action plan that translates into predictions for future measures that are needed to refine or revise the way a task is to be handled. The idea is to place the learning outcomes in a context or a real-life situation that is relevant to the experience. The basic understanding of ongoing experiment is to understand and conceptualise, and the lesson

learned from your reflection and made an action plan to use those in future activities to execute those activities differently next time and to avoid the same mistakes.

9.4 Gibbs (1988) Reflective Cycle

Likewise, the Experiential Learning Cycle, Gibbs' Reflective Cycle is a theoretical model. However, Gibbs' Reflective Cycle is useful in thinking through all the phases of an experience or activity. Reflective Cycle is often used as a framework in coursework assignments that require reflective writing. Gibbs Reflective Cycle is a six-stage model that is presented in Figure 29 below.

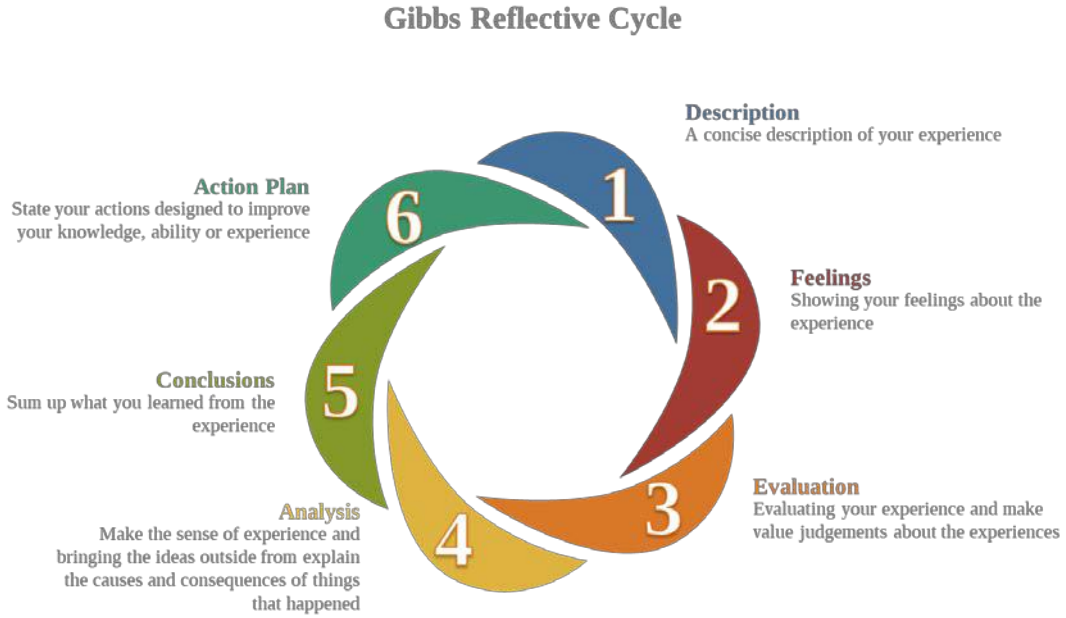


Figure 29: Gibbs Reflective Cycle

Adapted from "Learning by Doing" by Graham Gibbs. Published by Oxford Polytechnic, 1988.

9.4.1 Description

Describing is the first stage of the Reflective Cycle. Describing uses specific and relevant detail about the experience. The descriptive step is to provide a concise summary of your experience of an activity. This part is merely illustrative and used to explain the situation or event that was experienced. At the description stage, you should write about what happened during the exercise. Was there some that taught you about yourself or something that was new to you.

At this stage, you should describe everything that is relevant to your experience. However, it is essential to keep it to the point and avoid all unimportant details. The primary purpose of this stage is to give your reader a clear but concise picture of what went on during the activity.

9.4.2 Feelings

Once the description of the event or experience is given, the second stage 'Feelings' is about showing your feelings about the experience. In this section, you would answer questions such as, how did you feel about what has happened? In this, you would be bound to demonstrate your feelings such as, felt anxious, especially when something was a new experience for you.

In this section, you should try to describe your feelings. Moreover, the important thing is to demonstrate how you managed to do what was expected. In addition, as you anticipated that experience and what was your thinking before the experience.

Nevertheless, how did you react during the experience; was the action of others a useful thing to do, did you took it positively or negatively. For example, you would have thought that I would do that or why are they doing that.

Finally, what do you feel and what do you think after the experience. Did your thoughts and feelings change during the experience? If so, why? Moreover, did those feelings changed your actions or any of your views has changed?

9.4.3 Evaluation

This third section is to evaluate your experience and make value judgements about the experiences. This stage is about evaluating the good or bad about the experience. At this stage, you may ask questions about what worked and what did not work or what was right or wrong about your experience? To evaluate the good or bad about the situation, you would need to ask questions such as

What went well in the case, was this a learning experience and was it useful to take part in the activity? Moreover, what worked- What went well during the experience and what went wrong. In addition, how did the experience end? Was it a complete or incomplete experience. Finally, was it something you would like to experience again or not.

9.4.4 Analysis

Similar to Abstract Conceptualisation for Kolb's' Experimental Learning Cycle, the analysis stage in Reflective Cycle is about making sense of experience. Making sense requires bringing ideas from

different sources. The books, journals and websites should be used to show how well you are keeping up with evidence-based practice. This part is analytical in which you should explain the causes and consequences of things that happened. Moreover, in this part, you should demonstrate your knowledge of the particular subject, issue or idea.

This part will require reconsidering the things that went badly and write why you think they went wrong. In addition, the causes of action and consequences of action should be discussed to address if any negative impact. Finally, consider and explain how this affirmative action could have been further improved.

9.4.5 Conclusion

The conclusion part is, to sum up, your experience and mainly the learning points. The conclusion section requires specification about what you have learned and realised about yourself. Moreover, it is to reconsider the experience and answer what could you have done differently or what else could you have done? In addition, is there any issue that stopped you from doing this? Plus, if they're anything, you should have discussed with your mentor/supervisor or other team members. Finally, what is the current knowledge and level of practice and consider if any learning goals are achieved. This discussion leads to an action plan for further learning and improving future experience.

9.4.6 Action Plan

The final stage of the Reflective Cycle is to develop an action plan and state your actions designed to improve your knowledge, ability or experience. In this, you should be specific about your intention to learn further. This section should answer the question such as, how has the overall experience helped to improve your practice and has it revealed any strengths or weaknesses.

What is needed to face a similar experience in future? Even if the experience was positive and you did well, still there may be some areas that can be improved or any priority areas that need to be developed. Finally, list the steps you would need to take in order to achieve desired improvements.

9.5 Summary

Reflective writing is the key to develop advanced learning skills through experiencing activities. It offers the opportunity to observe the personal experience and evaluate the pros and cons of the experience. The reflective writing starts with describing the background and thinking back to explore your feelings about the experience and acceptance of the new ideas.

Not just that it helps to express your feelings about the ideas. The main aim of reflective writing is to express your thinking, and more importantly, why you think that way. Moreover, the reflective analysis helps to shape up your ideas. Through reflection, the opinions of others are appreciated and noticed, and further, recognise how you support or oppose the views of others. Finally, reflective writing led you to develop a plan for personal learning in future and avoid the same mistakes if you should have the same and similar experience.

Activity

Using the Gibbs' Reflective Cycle Give Your Comments on The Quality of Reflective Writing Given Below.

Highlight the areas that provide Description, Feelings, Evaluation, Analysis, Conclusion and Action Plan

The event took place in the park. There was a child playing with others. He looked hot and unfit. I watched the children for a while and walked on. Next day it was reported in the paper that the child had been taken to hospital seriously ill – very seriously ill. The report said that there were several passers-by in the park who had seen the child looking sick and who had done nothing.

Reading the report, I felt very guilty, and I have found it challenging to shift my feelings.

I did not stop because I was on my way to the shops to buy food for a meal that I had to cook. Though I saw that the child was ill, I chose not to act. If I had realised that he was sick, so, I would have acted differently. I guess I did really know, but I did not want to do anything about it. I know that.

I should have gone over and asked him what was wrong – and even got one of the other children to call for help. I am not sure if the support would have been ambulance or doctor at that stage – but it does not matter now. If he had been given help, then, he would not be fighting for his life.

I guess this situation has really shocked me. It reminded me of when my uncle died – but then again I don't really think that that is relevant. He was going to die anyway. My bad feelings about that situation were due to sheer sadness at his death and some irrational regrets that I did not visit him on the day before.

This event has really shaken me to my roots – more than I would have expected. It is making me think about actions in all sorts of areas of my life. Maybe it is the culmination of many events that have been happening recently, and I need to consider what is going on in my life

in a big way. I need to think about how to sort out all the different things that this has made me think about in my life.

Further reading

1. https://www.wlv.ac.uk/lib/media/departments/lis/skills/study-guides/LS006-Guide-to- Reflective-Writing.pdf
2. http://www.port.ac.uk/media/contacts-and-departments/student-support- services/ask/downloads/Reflective-writing---a-basic-introduction.pdf
3. https://learn.solent.ac.uk/mod/book/tool/print/index.php?id=2732
4. http://studyskills.southwales.ac.uk/media/files/documents/2013-08- 21/Gibbs_Model_of_the_Reflective_Cycle.pdf
5. https://www.brookes.ac.uk/students/upgrade/study-skills/reflective-writing-gibbs/
6. http://resources.eln.io/gibbs-reflective-cycle-model-1988/
7. https://www.simplypsychology.org/learning-kolb.html
8. http://www2.le.ac.uk/departments/gradschool/training/eresources/teaching/theories/kolb
9. https://www.learning-theories.com/experiential-learning-kolb.html

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Bolton, G. (2010) Reflective practise: writing and professional development. 3rd ed. London: Sage.

Cottrell, S.(2008) The Study Skills Handbook. 3rd ed. Basingstoke: Palgrave Macmillan.

MOON, J.A., 2006. *Learning journals a handbook for reflective practice and professional development.* 2nd ed. London: Routledge

Williams, K. & Wooliams, M. (2012) Reflective writing. Basingstoke. Palgrave Macmillan.

CHAPTER 10

POSTER PRESENTATION

10.1 Introduction

A poster offers an opportunity to attract an audience that is interested in the same subject area as yours. The poster presentation is a unique way to present a snapshot of the broader audience and disseminate your work, especially if your research falls within a particular area of specialisation. The poster presentation is a powerful way of networking with the people and organisations that may lead to future collaborations.

Presenting a poster also helps to receive feedback in the shape of comments and critics that can help you to improve your research practice and subject domain. Presenting a poster in a conference would attract peers and helps you to get concrete feedback that often provides an idea of improving your work. Sometimes, a poster presentation is better than other mediums due to time constraints. For example, an oral presentation may last up to 15 minutes, but a poster presentation session may last up to several hours, in which the audience have much time to ask questions and give one-to-one feedback.

In addition, a poster presentation helps you to enhance your presentation skills. It enables you to present a poster in different ways and try explaining the concepts and answer several questions the audience may have. A poster presentation is idle at every stage of research. It benefits you while discussing the research idea with other researchers from the same field.

10.2 What makes a good poster?

Posters are widely used by the research community. The research poster summarises a research context concisely and helps to generate discussion around the topic. A poster is generally a mix of text, images, diagrams, tables, charts and other presentation media.

A good poster displays relevant information about the research. In academia, a poster should include the university logo, a title, name of the researcher, references, module and the date.

A good poster has a short title that draws the interest of the audience. The total word count of a poster should not be more than 1000 words that are clear and to the point. A researcher should use bullet points, numbering and headlines to make are easy to read. However, the word count may vary depending on the nature of the subject area Moreover, efficient use of graphics, colour and fonts makes a good poster. A 50/50 blend is a right blend of text and images for an academic poster. However, 50/50 is just an idea a poster should also have a consistent and clean layout including any acknowledgements, names and institutional affiliations.

10.3 Tips and Hints of Poster Design

A poster should use a font that can be easily read by the audience from a distance of 5 to 10 feet. Therefore, different sections of a poster should have a consistent font size and style. Moreover, a blend of text and images should be clearly visible what has enough space between them. A good poster has a structure or layout that should be coherent to demonstrate the relation between the sections.

An academic poster typically follows your research design that includes the below headline.

- Abstract- a concise overview of the research
- Title -the concise name of poster/research
- Introduction -statement giving a quick overview of poster/research
- Problem -statement of the problem
- Method -brief description of the processes and procedures
- Results -outcomes, findings data
- Conclusion -summary, discussion of the significance of results, a few easily remembered key conclusion
- References- a few primary references

An example of good academic poster design is given below in Figure 3. However, the above list is exhausted and can be modified as per the demand of the research.

10.4 Software for Poster Development

The software can be used for poster design. However, Microsoft PowerPoint is a popular, easy-to-use option. It is part of Microsoft Office package and is available on the library computers. The alternative software is Adobe Illustrator, Photoshop and InDesign. Those are the feature-rich professional software that is suitable for posters, including lots of high-resolution images, but they are more complex and expensive. There are some open-source/free alternatives such as OpenOffice. 'Impress' the free alternative to MS PowerPoint and others are 'Inkscape' and 'Gimp' that are alternatives to Adobe products. MS Excel, Gliffy or Lovely Charts can be used for charts and diagrams.

Logo

Title of the Research Study

Logo

PEOPLE WHO DID THE STUDY

UNIVERSITIES AND/OR HOSPITALS THEY ARE AFFILIATED WITH

Introduction

We hope you find this template useful! This one is set up to yield a 24x36 horizontal poster.

We've put in the headings we usually see in these posters, you can copy and paste and change to your hearts content! We suggest you use keep black text against a light background so that it is easy to read. Background color can be changed in format-background-drop down menu.

The boxes around the text will automatically fit the text you type, and if you click on the text, you can use the little handles that appear to stretch or squeeze the text boxes to whatever size you want. If you need just a little more room for your type, go to format-line spacing and reduce it to 90 or even 85%.

The dotted lines through the center of the piece will not print, they are for alignment. You can move them around by clicking and holding them, and a little box will tell you where they are on the page. Use them to get your pictures or text boxes aligned together.

How to bring things in from Excel® and Word®

Excel- select the chart, hit edit-copy, and then edit-paste into PowerPoint®. The chart can then be stretched to fit as required. If you need to edit parts of the chart, it can be ungrouped. ***Watch out*** for scientific symbols used in imported charts, which PowerPoint will not recognize as a used font and may print improperly if we don't have the font installed on our system. It is best to use the Symbol font for scientific characters.

Word- select the text to be brought into PowerPoint, hit edit-copy, then edit-paste the text into a new or existing text block. This text is editable. You can change the size, color, etc. in format-text. We suggest you not put shadows on smaller text. Stick with Arial and Times New Roman fonts so your collaborators will have them.

Scans

We need images to be 72 to 100 dpi in their final size, or use a rule of thumb of 2 to 4 megabytes of uncompressed .tif file per square foot of image. For instance, a 3x5 photo that will be 6x10 in size on the final poster should be scanned at 200 dpi.

We prefer that you import tif or jpg images into PowerPoint. Generally, if you double click on an image to open it in Microsoft Photo Editor, and it tells you the image is too large, then it is too large for PowerPoint to handle too. We find that images 1200x1600 pixels or smaller work very well. Very large images may show on your screen but PowerPoint cannot print them.

Preview: To see your in poster in actual size, go to view-zoom-100%. Posters to be printed at 200% need to be viewed at 200%.

Feedback: If you have comments about how this template worked for you, email to sales@megaprint.com.

We listen! Call us at 800-590-7850 if we can help in any way.

Methods

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Figure #1

CHART or PICTURE

Results

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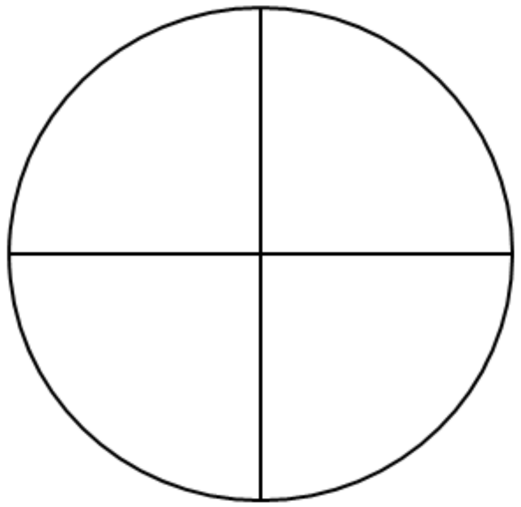
Figure #2



Conclusions

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Bibliography

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Useful links

http://www.soe.uoguelph.ca/webfiles/agalvez/poster/

http://guides.nyu.edu/posters

Microsoft PowerPoint Poster Templates

https://www.posterpresentations.com/html/free_poster_templates.html

https://www.genigraphics.com/templates

SIMPLIFIED RESEARCH METHODS

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