

CHAPTER 3

RESEARCH METHODOLOGY

In the previous chapter, the study presented the literature review which showed the existing data that explains sustainable engineering practices. This paved the way for this third chapter of the study, which is the research methodology, it shows how the study seeks to gather and analyse data that can help build a framework to enhance the engineering practices in the hospitality sector in Zimbabwe. In this chapter, the study is shown to have adopted a mixed methods approach to achieve its objectives. This involved conducting interviews with experts in the engineering subject sector as well as a Delphi study with experienced practitioners in Zimbabwe. Both primary and secondary data were analyzed to establish the application of sustainable engineering practices.

A research philosophy refers to the worldview of the researcher when undertaking a certain study and it plays a key role in assisting the researcher to identify suitable approaches that will be used for the research to collect and analyse data by understanding the basic ideas of research nature (Mugenda, 2019). According to Creswell (2014), there are four main research philosophies that can be adopted in a study, and these are shown below in Figure 3.1 below.

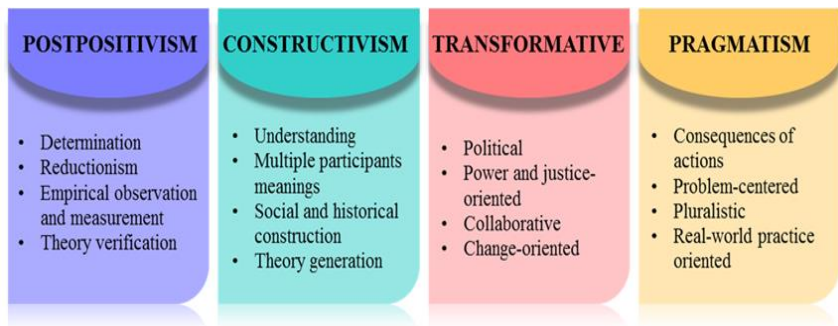


Figure 3.1: Research philosophies (*Creswell, 2014*).

As shown in the above figure 3.1, post-positivism is a philosophy that is used to identify and assess the factors that affect results. This philosophy adopts existing theories to develop hypotheses in the study therefore it is ideal to use in a purely quantitative study that seeks to measure relationships between variables (Saunders *et al.*, 2009). On the other hand, constructivism or interpretivism is opposing to

post-positivism as it supports qualitative aspect of the study and it relies as much as possible on participants' point of views (Creswell, 2014). It overrules the post-positivism assumption that structural laws and theories do not fit marginalized individuals in society (Creswell, 2014). The pragmatism philosophy might work well to deal with variation in the research questions (Saunders *et al.*, 2009). The application of qualitative and quantitative methods is combined to find a solution for the research problems caused by actions, situations, and consequences (Creswell, 2014). This paradigm, which concentrates more on research problems, prefers to adopt multiple approaches to determine the best practicable solution. For this study, the aim was to come up with a framework that enhances sustainable engineering practices in the hospitality sector and therefore a constructivist paradigm was deemed the most applicable approach to this study, as the focus of this research is to discover and understand the grounds of a concept, and to delve into the concept in comprehensive detail.

A research design according to Saunders (2017) is a roadmap of the study which shows where it is coming from and where it is heading. Research design is therefore a logical and concise procedure that drives a specific research direction through putting in place the appropriate research inquiries among research approaches. It is important in a study to primarily demonstrate the strategies and approaches that will be adopted to make sure that it is sound and feasible to be carried out (Marshall & Rossman, 2016).

The researcher recognised the overall strategy for this research, which coordinated the research questions, research objectives, and expected research outcomes with the data collection and analysis methods. This research is qualitatively designed, as it focuses on a single concept of phenomena that deals with in-depth investigation through theoretical and philosophical reviews. Thus, a qualitative design is adopted.

Qualitative design research adopted in this study was based on constructivist perspectives and it seeks to gain a better understanding by investigating what is occurring in the problem nature (Maxwell, 2013). Researchers have found qualitative data to work best for research that aims to discover, to explore a new area, and to develop hypotheses (Ogula, 2015). Therefore, the design of qualitative research should be reflective and flexible throughout the research process, and it should also be ready to modify the data collection and analysis activities and the developed theory, as well as the research questions, as these

may affect and be affected by one another. Creswell (2014) points out that the initial research plan cannot be tightly prescribed but the key issue is to focus on the participants and not the researcher's thoughts and the literature. The research design should not be rigid but flexible, as on-going research input may lead the flow of the research over time.

According to Maxwell (2009) in his interactive model of research design states that research design is based on the coherency among five components (goals, conceptual framework, research questions, methods, and validity) without strictly fixing and directional sing the sequence order (see figure 3.2). This interactive design is systematically conceptualised, in that every element has multiple connections among them instead of being in linear or cyclic form. However, Fellow and Liu (2008) also mentioned that in addition to the research questions and constraints, other factors, such as measurement instruments, reliability, and validity requirements, must also be considered in order to underpin the selection of approaches and strategies.



Figure 3.2: Interactive model of research design (*Maxwell, 2009*).

A qualitative approach can make use of various types of inquiry strategies, such as narratives, phenomenologist, ethnographers, grounded theory studies, or case studies (Creswell, 2014). According to Saunders *et al.* (2009), the selection of applicable strategies should be based on the research questions and objectives as well as the topic under study. In this study, the researcher used the adaptive theory that used a combination of pre-existing theory and theories emerging from data analysis in the research process.

This means that this research not only explores but also explains what is going on with regards to sustainable engineering practices. The study employed a multi-method qualitative approach, utilizing various data collection methods such as semi-structured interviews and a Delphi study. A detailed discussion of the data collection and analysis procedures is presented in the following section. On the first objective, the study sought to understand the major sustainable engineering practices that can be adopted in the framework. The objective also sought to identify the contribution of sustainable engineering practices in enhancing infrastructure sustainability. Further, the potential of sustainability in facilitating the redevelopment of infrastructure in the hospitality sector.

In summary, the overall research approach can be visualized using the “research onion” framework adapted from Saunders *et al.* (2009), as shown in Figure 3.3 below:

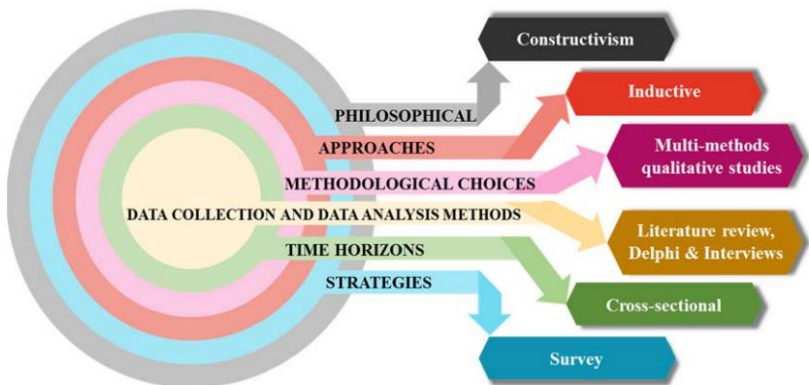


Figure 3.3: Overall research approach (*Saunders et al., 2009*).

The research process of this study was divided into two phases: the first being collecting data from the staff members in the hotel with regards to the sustainable engineering practices that are adopted in revitalizing or renovating hotel infrastructure. Further, a Delphi study was then undertaken to further identify, validate, and priorities relevant factors recognized during the interviews until a reliable consensus was achieved. The findings from the interviews, and Delphi study were triangulated to integrate the in-depth understanding, related issues, solutions, and recommendations.

Data collection is regarded as one of the major phases in research studies and it involves collecting and assembling information (Mugenda, 2019). Data comes in various forms, such as:

Fellow and Liu (2008) point out that data collection is a chain of communication that is between the respondent or the provider of data and the researcher who is the collector of data. There are two types of communication in data collection: either one-way or two-way communication. One-way communication requires either acceptance or rejection of the data that is provided. On the other hand, two-way communication allows for feedback from the provider to gather more information. It is important to show what types of data are to be collected before deciding on a data collection mechanism. Qualitative studies require considerable amount of time for assembling multiple types of research data. Observations, interviews, document archival, and audio-video recordings have been conducted to accumulate qualitative data. Each mechanism has its own advantages and limitations, as shown in Table 3.1 below.

Table 3.1: Qualitative data collection: Advantages and limitations (*Fellow & Liu, 2008*)

Data Collection Mechanism	Advantages	Limitations
Observations	<ul style="list-style-type: none"> • Researcher has a firsthand experience with the participant. • Researcher can record information as it occurs. • Unusual aspects can be noticed during observation. • Useful in exploring topics that may be uncomfortable for participants to discuss. 	<ul style="list-style-type: none"> • Researcher may be seen as intrusive. • Private information may be observed that researcher cannot report. • Researcher may lack good attending and observing skills. • Certain participants may present special problems in gaining rapport.
Interviews	<ul style="list-style-type: none"> • Useful when participants cannot be directly observed. • Participants can provide historical information. • Allows the researcher to have control over the line of questioning. 	<ul style="list-style-type: none"> • Provides indirect information filtered through the views of interviewees. • Provides information in a designated place rather than the natural field setting. • Researcher's presence may bias responses. • Not all people are equally articulate and perceptive.
Documents	<ul style="list-style-type: none"> • Enables a researcher to obtain the language and words of participants. • Can be assessed at a time convenient to researcher – an unobtrusive source of information. • Represents data to which participants have given attention. • As written evidence, it saves the researcher the time and expense of transcribing. 	<ul style="list-style-type: none"> • Not all people are equally articulate and perceptive. • May be protected information unavailable to public or private access. • Requires the researcher to search out the information in hard-to-find places. • Requires transcribing or optically scanning for computer entry. • Materials may be incomplete. • The documents may not be authentic or accurate.
Audio-Visual Materials	<ul style="list-style-type: none"> • May be an unobstructive method for collecting data. • Provides an opportunity for participants to directly share their reality. • It is creative, in that it captures attention visually. 	<ul style="list-style-type: none"> • May be difficult to interpret. • May not be accessible publicly or privately. • The presence of an observer may be disruptive and affect responses.

Therefore, qualitative researchers have alluded three main purposes for this type of research which are: to explore, to explain, or to describe (Marshall & Rossman, 2016). This study adopted an exploratory nature and made use of defined theories and applies them in a research context. The selection of an appropriate data collection mechanism depends on the types of information required to

answer the research questions. Robson (2002) provided simple rules to choose the method based on what the researcher is looking for, and these are presented.

According to Burns and Groove (2015) as target population refers to a certain large group of people known as who can provide primary data to a study mainly based on their involvement or relation to the subject matter under study. It is ideal to only select a target population that can provide accurate data that helps to attain clear results on the phenomenon understudy. In this study, the major aim was to come up with a framework that helps to enhance attaining accurate results. For this study, the target population was selected due to their knowledge, involvement and experience in the subject of engineering specifically in revitalizing or renovating infrastructure in the hospitality sector. These include internal stakeholders from the Hwange Safari Lodge specifically: the maintenance department which consists of engineers, welders, electricians and management. The target also includes external stakeholders who will participate in the Delphi method phase of the study specifically from the Environmental Management Agency (EMA) and engineers in various fields such as civil engineers, electrical engineers and structural engineers. In this study, the target population was made up of 40 elements divided as shown in the below Table 3.2

Table 3.2: Target population (*Field work, 2024*)

Description	Target population
Staff at Hwange Safari Lodge	30
Experts	10
Total	40

As shown above, the study participants will be dominated by the internal stakeholders of the hotel mainly because they are involved and responsible in the revitalization and maintenance of the infrastructure. These were made up of:

Sampling refers to the process adopted to minimize the size of the target population which may be hard to gather data from since the elements may be geographically dispersed or there may be a time limit in gathering data or the researcher may suffer from fatigue (Mugenda, 2019). Therefore, it is ideal to come up with a sample size that is big enough to represent the entire target population and it should involve all the elements of the population. This plays a key role in

making sure the results attained can be generalized to the entire population. For this qualitative study, the sample size will be determined by the point of saturation when gathering data from the population. The point of saturation works mostly when gathering data using interviews and it states that when a certain number of respondents says the same or similar responses to a certain question successively, the researcher can conclude the response to be representative of the entire population. In this study, the point of saturation was 10 elements.

Sampling technique are the methods used in a study by the researcher to select elements of the study (Kumar, 2014). There are two main forms of sampling techniques: probability sampling which entails the researcher using randomness to select elements and it work well in a quantitative study. Probability sampling adopts various methods such as simple random sampling and stratified random sampling. There is also non-probability sampling in which the researcher uses their own judgement to select the elements and work well in qualitative study. It also comes in various methods such as snowball sampling and judgmental sampling which was adopted in this study. Judgmental sampling entails the researcher selecting elements who are in the right occupation to answer the research question based on their own profession or expertise (Zickmund, 2013). In this study, the method was used to select staff members in the hotel who were directly involved in its maintenance or renovations. It was also used to select the experts from the external environment of the business who have expertise in engineering practices.

The study gathered data using interviews with staff members at the hotel and a Delphi with expertise that will help to build the framework of sustainable engineering practices in the hospitality sector in Zimbabwe.

An interview is an insightful discussion that involves at least two people to collect relevant and reliable research data. Saunders *et al.* (2009) divided interviews into two main categories: standardized interviews and non-standardized interviews. A standardized interview, also known as a structured interview, is typically used for quantitative data collection using interviewer-administered questionnaires. Meanwhile, non-standardized interviews are those that are more modifiable. They may use multiple forms of communication, as shown in Figure 3.4.

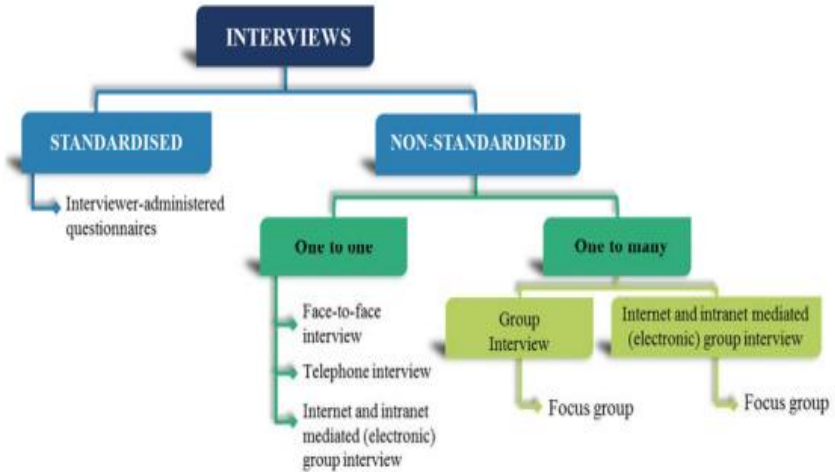


Figure 3.4: Forms of Interviews (*Saunders, 2017*).

Interviews may also be categorized into three types; structured, semi-structured, and unstructured. Structured interviews operate with a list of predetermined questions, while unstructured interviews are conducted freely without a specific flow of questions. Intertwined between these, semi-structured interviews are designed with several main predetermined questions to guide the flow of conversation. Relevant or potential sub-questions also are prepared by the researcher. This research was highly exploratory, because there is limited a priori information regarding the adoption of sustainable engineering practices in the hospitality sector. The interviews allowed the researcher to recognize the limit of understanding, as well as to gain access to the interviewees' subjective understanding (Seidman, 2006). Moreover, data were gathered in a relatively short timeframe with the resources available. Figure 3.5 shows the flow of the interview process used for this research, which is further explained in the following sub-sections.



Figure 3.5: General flow of interviews (*Creswell, 2014*).

In this study, face to face interviews were conducted and the researcher made use of technology through the voice recording device to capture the responses of the interviewees. The face to face-to-face interviews in this study were an effective form of engagement that provided prompt responses through direct verbal exchange of information. This was key in helping the researcher to determine the body language of the respondents and facial expression which are key in showing the mood of the respondents (Rowe & Wright, 2011). Face to face interviews are key in helping the participants to express their own perceptions as well as to clarify any questions or instructions.

The Delphi technique refers to systematic procedure of structuring a group communication process between the researcher and a group of identified experts in a specific field on a specified topic by assessing the feedback of individual contributions in relation to information and knowledge (Yousuf, 2007). This exchange of information encompasses anonymous interaction where disagreement among experts exists, and iteration is then repeated to the extent that a general

agreement achieved. The Delphi method is particularly adopted in situations where there is lack of empirical evidence for the study (Ameyaw *et al.*, 2016). It is also more useful in relatively new topics that require a holistic perspective.

However, on the other hand, Delphi study requires more time to undertake and complete as the proceeding rounds can only be executed once the analysis of the previous outcome has been completed. The process of each round may last up to several weeks. On the other hand, developing electronic and information technology provides an opportunity for researchers to employ this technique more easily. It also provides convenient times and places for individuals to be able to participate in a group communication process without a physical presence (Linstone & Turoff, 2011), making it an inexpensive method to organize and administer (Gupta & Clarke, 1996).

In this study, a modified Delphi was used in this research. Differing from the traditional Delphi practices, where the first Delphi round is intended to seek qualitative information from the panellists, this Delphi study aimed to evaluate the relative importance or relevance of the thoughts that emerged from the interviews and literature studies. The round of the Delphi questionnaire was designed to validate the consolidated list of items identified in the literature and interviews. A total of 10 panelists participated in this round. The questionnaires were distributed online and physically to make sure they are received on time. The panelists were informed that there would be a second rounds of questionnaires and the approximate expected length of time for them to complete the questionnaire which was between 7 days (1 week).

Triangulation is practice of combining multiple methods of research (Oleinik, 2011). In qualitative research, triangulation is regarded as a strategy to provide validity to the study through the merging of information from different methods (Carter *et al.*, 2014). The integration of multiple methods and cross-verification is more reliable than relying on a single source of evidence. This study used triangulation in the data collection method by using interviews, and the Delphi study. This research involved both qualitative and quantitative data, and by combining multiple types of data covered the disadvantages that comes with adopting a single method.

The important element of conducting research is to demonstrate research rigour and validity. According to Zickmund (2013), this begins with the researcher as the

main instrument. The researcher should be well-equipped with research skills and literature knowledge about the subject to be researched. Research rigor needs to be upheld and maintained during the whole research process (Meadows & Morse, 2001). However, the rigour of qualitative and quantitative research is construed differently (Given, 2016). Quantitative research is not viewed as more rigorous than qualitative research, or vice versa.

Credibility is equivalent to internal validity in quantitative research, which denotes the ability to represent the truth value of a study. Appleton (1995) claimed that the credibility of a qualitative study is deemed if it reveals accurate descriptions of individual experiences. Thus, other people who shared a similar experience will recognize it (Thomas & Magilvy, 2011). Shenton (2004) also suggested that qualitative research is credible when the investigator can demonstrate a true picture of the phenomenon under study. He stated that it is important to provide a detailed description of the research area, the actual situations being investigated, and the context surrounding them. In this research, the researcher provided the scope of study, as presented in chapter 1, to make sure the research topic and scope were appropriately identified and described. More so, to ensure credibility of the interviews, audio recordings were used in this research, which allowed the conversations to be replayed multiple times to provide more accurate transcription.

Mugenda (2019) pointed out that conformability establishes the trustworthiness of qualitative research. This occurs once credibility, transferability, and dependability have been established (Thomas & Magilvy, 2011). Flick (2007) indicated that reliable studies exhibit data transparency, which offers recognizability between interviewee statements and researcher interpretation. In this study, the quotations of the interviewees' statements are provided in italics. Quoting the interviewees statements along with the researcher's interpretation provides conformability that the findings are grounded in the interviewees' data, not solely the researcher's point of view.

In research, ethical considerations are essential as they make sure that all the stakeholder of the study are not negatively affected by the study for instance the participants, the researcher and the organisations at large. In this study, research ethics were adopted from its inception and mostly in the data collection and analysis phase. The researcher first of all attained permission from the authorities of the hotel to undertake the study. Further, the consent of the respondents was

ensured without using threats or lies. During the data collection phase, the privacy of the respondents was ensured, and the researcher made sure the private space of the participants was not bombarded. Further, the researcher did not temper with the data during analysis to influence results.

This research methodology chapter of the study is the research methodology and it showed the way the study seeks to gather and analyse data that can help build a framework to enhance the engineering practices in the hospitality sector in Zimbabwe. The study adopted mixed methods to achieve the set objectives and employed a combination of interviews and Delphi study with experienced practitioner in Zimbabwe who have expertise in engineering. The next chapter of the study is data analysis and presentation.