**37th International Science Technology Education Arts Management
& Social Sciences (iSTEAMS) Cross-Border Conference - Accra Ghana 2023**

Research Design and Methodologies for the Development of a Human-Centered Framework for evidence Gathering in Cybercrime Investigation.

[1]Baafi Benjamin, Longe Olumide Babatope (PhD) & Joseph Budu (PhD)
Department Of Information Systems and Innovation
Master Of Science in Digital Forensics and Cybersecurity
Ghana Institute of Management and Public Administration
[1]E-mail: benjaminbaafi@ymail.com
[1]Phone: +2330244058435

ABSTRACT

This paper discuss the researcher's background, methodologies, and techniques directed at the evolution of a human-centred framework for evidence gathering in cybercrime investigation. We provided the rationale and explanation for our approach and procedures which were used to address the research questions posed by the researcher. We also discuss the procedures utilized in data collecting and analysis. We selected a conventional research technique based on the data to be gathered, research questions, objectives, and the purpose of the study. We then establish a research method and technique to be employed for the research as a stimulant for effective research.

Keywords: Research Design, Methodologies, Human-Centered Framework, evidence gathering, cybercrime investigation.

1. BACKGROUND TO THE STUDY

Research is defined as a "systematic study or inquiry in which data are gathered, analyzed, and interpreted in some manner in an attempt to understand, characterize, forecast, or control.

phenomena or to empower persons in such circumstances" (Mackenzie and Knipe 2006: 2). A paradigm is a framework for studying social science issues (Walter 2013). A paradigm is described as "a loose collection of logically connected assumptions, notions, or propositions that orient thought and research or the philosophical goal or motive for completing the study" (Mackenzie & Knipe 2006: 2). This section contains discussion on the paradigms investigated, rejected, or chosen depending on their compatibility with the researcher's point of view.

The context in which the study is done has an impact on the paradigm selection. Because this project was undertaken inside government entities engaged in scientific activity and following established protocols, the scientific (positivist) paradigm was initially evaluated. The "positivist paradigm, often known as scientific method' or science research,' is based on rationalistic, empiricist philosophy" (Mackenzie and Knipe 2006: 2). Positivist researchers are independent of the research, seeking "absolute information about an objective world" (Scotland 2012: 10). Positivist approach seeks to explain links by aiming to uncover reasons that impact results (Scotland 2012) and providing for The Effectiveness of Forensic Identification Evidence in Policing in Ghana methods used by police in performance evaluation. Quantitative approaches are most often utilized in positivist research and policy formation. The verifiable proof is produced by firsthand experience and observation of the use of empirical testing, random sampling, controlled variables, and control groups (Scotland 2012). Positivism seeks to simplify and regulate variables in order to reduce complicated interactions to their fundamental pieces.

3. RESEARCH DESIGN

It is critical to comprehend why this study is classified as social science research. (Emerson, 2018) defines social research as the "systematic study of society, its patterns, and the processes that determine what individuals do." Policing is a component of society and, in many ways, a society in and of itself, with its own culture that has affected how activities are carried out and how individuals fulfil their duties. This study seeks to discover and explore the social patterns prevalent in policing, as well as to comprehend their social significance. To put this into perspective, the social pattern refers to the procedures used to investigate high-volume crimes; these processes occur often and have certain similarities throughout Ghana.

This study seeks to make sense of these processes and the use of forensic evidence in order to grasp the social meaning. This study will contribute to the entire body of knowledge, with a special focus on Ghana, and will challenge some of the prevailing assumptions regarding the Human-Centered Framework for evidence gathering in cybercrime investigation in Ghana. While this study is intended to possibly influence and steer policymaking, it also seeks to be available to a larger audience via widespread distribution through peer-reviewed publications (Heckathorn, 2011). Both quantitative and qualitative research methodologies are employed in postgraduate study and are relevant to modern social research practice (Etikan, I., Alkassim, R., & Abubakar, 2015). "Quantitative research seeks to reduce and quantify social phenomena, while qualitative research seeks to comprehend social processes" (Vashistha, Cutrell, & Thies, 2015). The capacity to create comparisons and connections utilizing numerical data to generate meaningful and trustworthy conclusions and outcomes is a fundamental premise of quantitative research.

It is often used for large-picture research and huge projects, employing research at a national, state, or sub-group level to enable the detection of patterns from associations between distinct events. To apply this research technique successfully, the researcher must first grasp the kind of data, the research question(s) that comprise the study, how the data is acquired, and the sample procedures (Górny & Napierała, 2016).

Because qualitative research techniques do not need the same amount of statistical analysis as quantitative research methods. They may seem less sophisticated as quantitative research methodologies. However, qualitative to be successful, research needs meticulous attention to detail and theoretical knowledge. The study has a societal significance. This strategy enables the researcher to "explore chosen cases." "Deep and detailed problems" (Crawford, Wu, & Heimer, 2018). There is a tendency to view qualitative techniques are mostly concerned with in-depth interviews, but it places a priority on data collection

and data analysis that is "deep and rich in the understandings that they bring to the table "social" Comparing the effectiveness of respondent-driven sampling and quota sampling in migration research (Górny & Napierała, 2016). It is not interested in organized comparisons, rather in comprehending the significance of acts and the viewpoints that may be related to settings, behaviors, or encounters In contrast to quantitative research, which has a large sample size qualitative research focuses on smaller groups of individuals in society with an emphasis on aims to offer social context and is useful for analyzing "'taken-for-granted methods of doing things" carrying out actions" (Taherdoost, 2018). Qualitative research methodologies are appropriate for this study. in order to comprehend the function of forensic identification evidence in decision-making as determined by the investigators, Qualitative research provides comprehensive knowledge that includes an understanding of human phenomena, as well as a framework that recognizes the significance of context above and beyond measurement.

Table 1: Research Paradigms, Methods & Data Collection Tools

Paradigm	Methods (Primarily)	Data collection tools (examples)
Positivist/ postpositivist	Quantitative. "Although qualitative methods can be used within this paradigm, quantitative methods tend to be predominant…" (Mertens 2005: 12)	Experiments Quasi-experiments Tests Scales
Interpretivist	Qualitative methods predominate although quantitative methods may also be utilised.	Interviews Observations Document reviews Visual data analysis
Pragmatic	Qualitative and/or quantitative methods may be employed. Methods are matched to the specific questions and purpose of the research	May include tools from both positivist and interpretivist paradigms. e.g., interviews, observations, testing and experiments

Source (Hays et al., 2016)

Research Approach

Given the paucity of prior research on the Human-Centered Framework for evidence gathering in cybercrime investigation, and given the inherent complexities of this study, an inductive method was chosen as the most appropriate technique for gathering information and drawing conclusions. The importance of investigating a specific context cannot be overstated for the purposes of this research. Not only will doing so help to deduce individual interaction (Emerson, 2018).but it will also help to emphasize the barriers and motivators that influence the Framework for evidence gathering in cybercrime investigation. The strength of the research's theoretical justification is the primary consideration when deciding whether or not to use a case study approach (Etikan, 2017). This study is an investigation into the real-world situation of why the Framework for evidence gathering in cybercrime investigation is not comprehensive to handle or resolve complicated cybercrime cases"

Table 2: Relationship between Quantitative and Qualitative research

	Quantitative Research	Qualitative Research
	Reality is fragmentable, tangible and single	Realities are holistic, multiple and socially constructed
	Research inquiry is value-free and objective	Research inquiry value bond and subjective
	known and unknown are independent of each other, a dualism	known and the knower are inseparable and interactive
	primacy of method	the primacy of the subject matter
	Relationship between variables can be measured and identify	research variable is difficult to measure, interwoven and complex
Assumption	research is value-free and the inquiry is objective	research inquiry is value bond and subjective
	Generalizability	contextualization
	prediction	interpretation
Research purpose	explanation is causal	in-depth understanding from the actor's perspective
	Research begins with theories and hypothesis	research ends with grounded theory or hypothesis
	control and manipulation	portrayal and emergence
	uses structured instruments and format	the researcher is seen as the instrument
	intervention and experimentation	non-intervention and naturalistic
	the research approach is deductive	the research approach is inductive
	component analysis	patterns are being searched
	seeks consensus, the norm	seeks complexity, pluralism
	reduce numerical indices of data	make minor use of numerical data
Approach	abstract language in research writing	descriptive in research writing

Source: (Sundler, Lindberg, Nilsson, & Palmér, 2019)

This study uses a qualitative methodology since it provides the most insightful context for understanding the phenomena under the inquiry (Rahi, 2017).

Research Philosophical approach

To explain the epistemological choice of interpretivism, which led to the conclusion that a scientific method would not be suitable for the study of human subjects within a community or organization, we note that interpretivism holds that people reflect and think (Walsham, 2006). Unlike inanimate objects, humans may be expected to act rationally once they become aware that their conduct is being watched. Because of this, studies that need an in-depth comprehension of social interaction should use interpretative methods (Górny & Napierała, 2016). Within an interpretative research framework, ontology suggests that the world we inhabit is not the world itself, but rather a complex world in which knowledge among individuals is constantly negotiated over the nature of the world based on their lived experiences (Taherdoost, 2018). The philosophical assumptions and paradigms behind every scientific study may be broken down into three main camps: the critical realist, the positivist, and the interpretive (TenHouten, 2017).

Table 3.: Difference between interpretivism and positivism

Assumptions	Positivist	Interpretivist
Nature of the world	Single, objective and tangible	Multiple and social constructed
Research goal	Strong prediction and explanation	weal prediction and understanding
Research Interest	what is average, representative and general	what is unique, deviant and specific
knowledge generated	Laws	Meanings
Researcher and subject relationship	Rigid separation	participative cooperative and interactive
information desired	How many people have a specific problem	that type of problem is individual confronted, and how they handle such a problem

Source: **Pizam and Mansfeld (2009)**

4. METHOD OF DATA COLLECTION

Different data gathering techniques are employed in qualitative research; the most popular ones include focus groups, interviews (group or individual), the observation method, and action research. Research methods are the methodology used by the researcher for data collection and analysis. Regardless of the data gathering technique used, combining two or more approaches (such as focus groups and interviews) increases the research's credibility (Sidhu, Jones, & Stevenson, 2017).

This study will use interviews to gather data; there are three different forms of research interviews: semi-structured, unstructured, and structured. According to (Smith & McGannon, 2018), a structured technique of data collecting entails the researcher orally distributing questionnaires that include prepared questions and request replies.

Constrained structure interviews are used in this study because they are quick and simple to conduct and because they are essential if the researcher wants a respondent's rapid response to a topic (Aguinis & Solarino, 2019). To acquire information regarding how KS is hindered inside a company, the researcher will have one-on-one conversations with the respondent and focus group discussions. Time-consuming data collection is a constant in qualitative research. As a result, data is often obtained from a smaller sample than what is used in a quantitative method (Hays et al., 2016). The goal of the interviewing technique is to guarantee that the responder shares their thoughts and theories about the reasons why a team member refuses to share their expertise (implicit or tacit). Face-to-face interviews, which are usually known as research instruments, provide a deeper knowledge of the respondent's experience, individual behavior, and beliefs. The conceptual framework the researcher has chosen will be utilized as a guide in generating interview questions (Sundler et al., 2019).
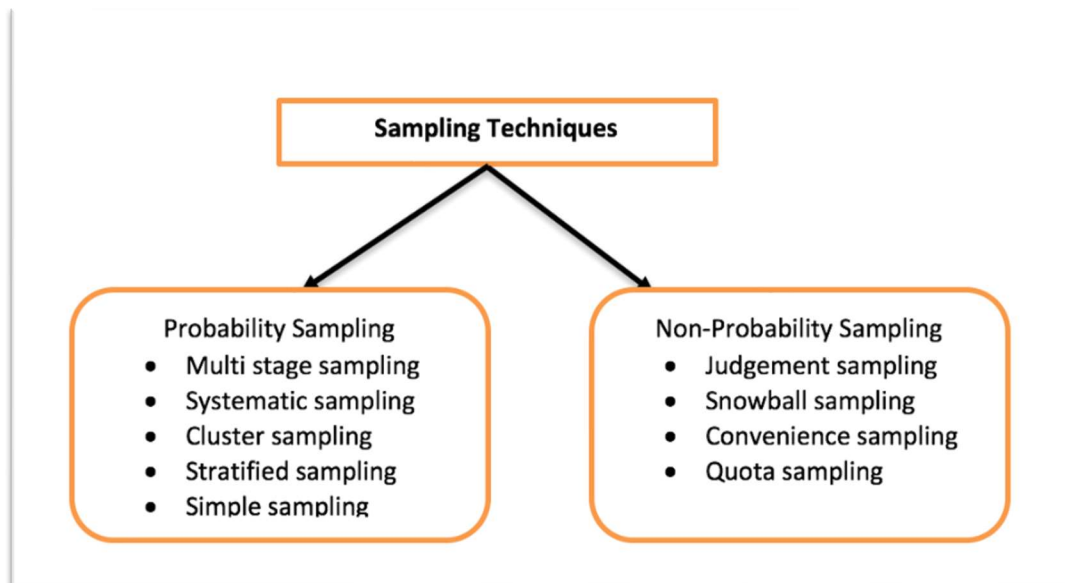

Figure 2: Sampling Techniques (Mackieson, Shlonsky, & Connolly, 2018)

Chain referral sampling, commonly referred to as snowball sampling, is a non-probabilistic (non-random) sampling technique employed in this study to choose participants (Hamilton, 2019). The snowball sampling approach asks respondents to main data sources to suggest another possible source of primary data that may be contacted or recruited for the study ("Understanding Reliability and Validity in Qualitative Research," 2003). The snowball approach is based on recommendations from the first responder contacted.

This approach is often used to acquire primary data from a company's employee while doing research on that organization, in this instance AUN Yola. When a response is located, he or she assists in hiring new workers by supplying contact information (Morse, 2015). There are three types of snowball sampling: linear snowball sampling, exponential non-discriminative snowball sampling, and exponential discriminative snowball sampling Ensuring Trustworthiness in Qualitative Research. This study uses a linear snowball sampling technique that begins with the construction of a sample group from a single respondent or subject who provides a single recommendation. The referral is then included in the sample group and suggests another referral, and so on until the sample group is full (Smith & McGannon, 2018). The researcher selected ten (25) participants from the total population sample for focus group discussion. They were engaged in conversation in order to gather information that will help in answering the research questions raised by the researcher

5. CONCLUDING REMARKS

There is a dearth of literature on law enforcement and the responsibilities of members of the Cybercrime Advisory Council in combating cybercrime jointly, as stated in the introduction and literature review. Most previous studies (Hassan et al., 2012; Adesina, 2017) concentrated on the causes and effects of cybercrime in Ghana; laws that penalize computer misuse (Olusola et al., 2013b; Saulawa and Abubakar, 2014); and focused relatively on the financial cost and socio-economic effects of cybercrime (WITFOR, 2005; Sesan et al., 2012).

The present research combines all these many elements and makes an effort to comprehend cybercrime from the perspective of Ghana law enforcement, similar to the studies done by Maghairah (2009) and Alkaabi (2010). This paper sets our our research methods and designs as well as research paradigm and philosophical underpinnings. Future work will I itiate data gathering and report the results from data analysis.

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